SPONS'
ARCHITECTS, BUILDERS' AND CONTRACTORS' POCKET BOOK OF PRICES & MEMORANDA

1878.

EDITED BY W. YOUNG.

SPONS'
ARCHITECTS' AND BUILDERS' POCKET-BOOK

OF

Useful Memoranda and Prices.

BY

W. YOUNG, ARCHITECT,

AUTHOR OF 'PICTURESQUE ARCHITECTURAL STUDIES,' &C.

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PREFACE TO THE THIRD EDITION.

The favourable reception which has been accorded to this little work gives the opportunity, in revising for another edition, to extend the Memoranda, and to still further develope the original plan of the work, to make it an accurate and reliable, as well as convenient handbook. The arrangement of the matter in alphabetical sequence, thereby making it easy to turn up any desired formula or memorandum in a moment, will, it is hoped, be an advantage to those whose time is valuable.

W. Y.

Exeter Hall, Strand, W.C.
December, 1875.

The Author will be glad to receive any information or suggestions calculated to render this Book more useful.

Exeter Hall, Strand, W.C.,
December, 1877.

SPONS'

Architects' and Builders' Pocket-Book.

ABSORBENT POWERS of stones saturated under exhausted receiver of an air-pump.

(Commissioners' Report.)

Sandstones—		
Craigleith	=	0·143
Heddon	=	0·156
Kenton	=	0·143
Mansfield red	=	0·151
Oolites—		
Ancaster	=	0·180
Bath Box	=	0·312
Portland	=	0·206
Ketton	=	0·244
Magnesian Limestones—		
Bolsover	=	0·182
Huddleston	=	0·239
Roach Abbey	=	0·248
Park Nook	=	0·249
Limestones—		
Barnack	=	0·204
Chilmark	=	0·053
Ham-hill	=	0·147

[ABS

ALGEBRAIC SIGNS used in the following Memoranda.

The sign $=$ (*equal*) denotes that the quantities between which it stands are equal to one another.

The sign $+$ (*plus*) denotes that the quantities between which it stands are added together.

The sign $-$ (*minus*) denotes that the quantity after it is to be subtracted from the quantity before it.

The sign $\times$ (*into*) denotes that the quantities between which it stands are to be multiplied together; but very often a full point is used instead of $\times$, or, still more commonly, one quantity is placed close after the other without any sign between them. Thus $a \times b$, $a.b$, and ab mean all the same thing, *viz.* a multiplied by b.

$3a$ denotes 3 times a.

$\div$ (*by*) denotes that the quantity which stands *before* it is to be divided by that which *follows* it, but most frequently the quantity *to be* divided is placed over the other with a line between them. Thus $a \div b$ and $\frac{a}{b}$ mean the same thing, *viz.* a divided by b.

A small figure above a quantity to the right denotes the *power*, or number of times it is to be repeated. Thus

a^1 means the 1st power of a.				
a^2	,,	2nd	,,	or square of a.
a^3	,,	3rd	,,	or cube of a.
a^4	,,	4th	,,	of a, &c.

$\sqrt{a}$ denotes the square root of a.

$\sqrt[3]{a}$ denotes the cube root of a.

( ) (*brackets*) denote that all the quantities within them are to be treated as forming one quantity. Thus $a-(b-c)$ is not the same as $a-b-c$; for in the last both b and c are subtracted, whereas in the former it is the quantity $b-c$ which is subtracted.

A line drawn over the quantities denotes the same as brackets; thus $a-\overline{b-c}$ is the same as $a-(b-c)$; again, $\dfrac{a+b-c}{4}$ implies that the product of $a+b-c$ is to be divided by 4.

ANCIENT LIGHTS. (Homersham Cox.)

OBSCURATIONS BY OBSTACLES OF UNIFORM ANGULAR WIDTH AND HEIGHT.

Angular height (v).	Angular width (h).								
	5°	10°	15°	20°	25°	30°	35°	40°	45°
5°	·005	·010	·015	·019	·023	·027	·031	·035	·039
10	·010	·019	·028	·037	·046	·055	·063	·070	·077
15	·014	·028	·042	·055	·068	·081	·093	·105	·115
20	·019	·037	·055	·073	·090	·106	·122	·137	·151
25	·023	·045	·067	·089	·110	·130	·149	·167	·184
30	·026	·052	·078	·104	·128	·152	·174	·195	·215
35	·030	·060	·089	·118	·145	·172	·197	·221	·243
40	·033	·066	·098	·129	·160	·189	·217	·243	·268
45	·036	·071	·106	·139	·172	·205	·234	·263	·288
50	·037	·075	·113	·148	·183	·217	·249	·279	·307
55	·040	·079	·118	·155	·192	·227	·261	·293	·322
60	·041	·082	·122	·161	·199	·235	·270	·303	·333
65	·042	·084	·125	·165	·204	·241	·277	·310	·341
70	·043	·085	·127	·168	·208	·245	·282	·316	·347
75	·043	·086	·128	·170	·209	·248	·285	·319	·350
80	·043	·086	·129	·171	·210	·249	·286	·320	·352
85	·043	·086	·129	·171	·211	·250	·287	·321	·353
90	·043	·086	·129	·171	·211	·250	·287	·321	·353

OBSCURATIONS BY OBSTACLES, &c.—*continued.*

Angular height (v).	Angular width (h).								
	50°	55°	60°	65°	70°	75°	80°	85°	90°
° 5	·042	·045	·048	·050	·052	·053	·054	·055	·055
10	·084	·090	·095	·099	·103	·106	·108	·109	·109
15	·124	·133	·141	·147	·153	·157	·160	·162	·162
20	·163	·174	·184	·193	·201	·206	·210	·212	·212
25	·199	·214	·225	·236	·245	·252	·256	·260	·260
30	·233	·249	·263	·275	·286	·294	·299	·303	·303
35	·263	·281	·297	·311	·323	·333	·338	·342	·343
40	·290	·310	·328	·344	·356	·366	·373	·377	·378
45	·313	·335	·354	·371	·384	·395	·403	·408	·409
50	·333	·356	·376	·394	·408	·419	·428	·433	·434
55	·349	·373	·394	·413	·427	·439	·448	·453	·455
60	·361	·386	·408	·428	·443	·455	·464	·469	·471
65	·370	·396	·418	·438	·453	·466	·475	·480	·482
70	·376	·402	·425	·445	·462	·475	·484	·489	·491
75	·380	·406	·429	·449	·466	·479	·489	·494	·496
80	·382	·408	·431	·451	·468	·481	·491	·496	·498
85	·383	·409	·432	·452	·469	·482	·492	·497	·499
90	·383	·410	·433	·453	·470	·483	·493	·498	·500

The way in which the Table is read is as follows:—Suppose an obstacle has an angular height of 40°, and a width which subtends an angle of 30° on one side (say to the right) of the aperture; we look in the side row of figures in the Table for 40°, and in the top row for 30°. The corresponding tabulated figure is 189, or the obscuration is $18\frac{9}{10}$ per cent. of full light. Suppose the *same* obstacle also subtends 20° to the left of the aperture, the height being 40° as before. The tabular figure, corresponding to 20° width and 40° height,

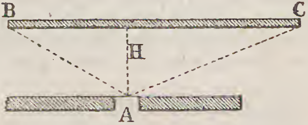
is 129, or the obscuration due to this part of the obstacle is $12\frac{9}{10}$ per cent.

Adding the obscurations 189 and 129 together we get 318, or $31\frac{8}{10}$ per cent. of full light abstracted by the whole obstacle.

The angle for width is always measured from the line perpendicular to the front or plane of the window, and is the angle which the width of the structure subtends at the level of the window. Consequently, if the obstacle extends both to the right and left of the window, the two parts to the right and left must be measured separately, and the obscurations of the two parts are to be added together.

In the annexed Fig. 1, let B C be a horizontal section of the obstacle (the section being taken

Fig. 1.

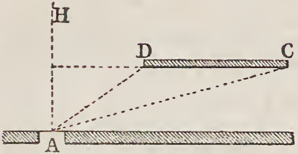


at the level of the window A), and let A H be a line of any length perpendicular to the plane of the window. Then H A B and H A C are the two angles of width, and the obscurations produced by the two parts of the obstacle which have these widths respectively are to be computed separately. The results added together give the total obscuration.

In the case where the obstacle is wholly to the right (or left) of the window, the process is as fol-

lows :—Suppose D C (Fig. 2) is the section of the obstacle, the section being taken on the level of

Fig. 2.



the window A. Let A H be a line of any length perpendicular to the plane of the window. First, measure the obscuration just as if the line D C were continued to meet the line A H; then subtract from the result so much as would be due to an obstacle having the angle width D A H. For instance, suppose the nearest corner of the obstacle is 15 degrees to the right of the aperture, and the farthest corner is 40 degrees. Suppose the angular height to be 70 degrees. The obscuration due to width 40° and height 70° is, by the Table, ·316. The obscuration due to width 15° and height 70° is, by the Table, ·127. Therefore, ·316—·127= ·189, or $18\frac{9}{10}$ per cent. is the actual obscuration.

RELATIVE ILLUMINATING EFFECTS OF EVERY TEN DEGREES OF SKY MEASURED FROM THE ZENITH.

Arcs of Ten Degrees each.	No. of Rays out of every hundred which the Aperture receives from each Arc.
Between 90° and 80° ..	1·5
„ 80 „ 70 ..	4·5
„ 70 „ 60 ..	7·
„ 60 „ 50 ..	10·
„ 50 „ 40 ..	13·
„ 40 „ 30 ..	14·
„ 30 „ 20 ..	16·
„ 20 „ 10 ..	17·
„ 10 „ 0 ..	17·

ANGLES. See Triangles, p. 197.

APPROXIMATE COST of Buildings. per cubic ft.

Labourers' cottages	4*d.*
Small suburban houses	6*d.* to 8*d.*
Gentleman's country house, 2nd class	8*d.*
Gentleman's 1st class mansions—for main building	10*d.* to 15*d.*
Gentleman's 1st class mansions—for servants' offices	6*d.* to 10*d.*
Stables	7*d.* to 10*d.*
Churches (minimum)	6*d.*
Town halls, law courts, and other public buildings of the 1st class ..	13*d.*
Lunatic asylums and buildings of the class	6*d.* to 7*d.*

COST OF BUILDINGS EXECUTED.

Houses of Parliament	2*s.* 6*d.*
Foreign Offices	1*s.* 0¾*d.*
Manchester Assize Courts	9½*d.*

Approximate Cost of Buildings. Professor Kerr.

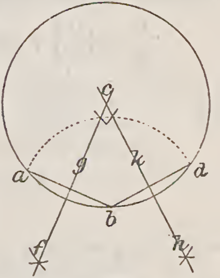
Total Outlay required.	The Family Department. 1. Price per cubic foot.	2. Average height of rooms.	3. Price per superficial square.	4. Corresponding number of squares.	5. Cost at the prices given.	6. Number of rooms to correspond.	7. Average price per room.	The Servants' Department. 1. Price per cubic foot.	2. Average height of rooms.	3. Price per superficial square.	4. Corresponding number of squares.	5. Cost at the prices given.	6. Number of rooms to correspond.	7. Average price per room.	Total Outlay resulting.
£	d.	ft. in.	£		£		£	d.	ft. in.	£		£		£	£
1,250	8	12 0	40	22·30	892	13	68	6	11 3	28	12·90	361	13	28	1,253
2,500	9	12 9	48	37·50	1,800	20	90	6½	11 7	31½	22·20	700	19	37	2,500
5,000	10	13 9	57⅔	63·10	3,639	30	121	7	12 0	35	39·00	1,365	29	47	5,004
10,000	11	15 0	69	106·00	7,314	45	163	7½	12 6	39½	68·00	2,686	43	62	10,000
20,000	12	16 6	83	178·00	14,774	67	220	8¼	13 0	44½	117·70	5,237	65	80	20,011
40,000	13½	18 0	100	298·00	29,800	100	298	9	13 6	50	204·00	10,200	97	105	40,000
80,000	15	19 0	120	501·00	60,120	150	400	10	13 6	56	355·00	19,880	145	137	80,000

ARC.

Given the arc of a circle to find its centre.

Let $a\,d$ (Fig. 3) be an arc of a circle; to find its centre take any three points in the arc $a\,b\,d$, and draw straight lines $a\,b$ and $b\,d$, and bisect them as at $f\,g$ and $h\,k$, and continue the lines till they intersect at c, then c is the centre of the arc.

Fig. 3.



ARCHES.

1. Arches whose voussoirs are of an even number exert more thrust than those which are of an unequal number; that is, which have a keystone.

2. A semicircular arch divided into four parts has more thrust than one divided into nine voussoirs.

3. Thrust does not increase as the thickness of the arch increases, so that, *cæteris paribus*, an arch of double the thickness has not double the thrust.

4. A semicircular arch whose extrados is equally distant throughout from, or in other words concentric with, the intrados, when divided into four equal parts, will only stand when its depth is less than the $\frac{1}{18}$th part of its diameter, even supposing the abutments immovable.

5. Arches whose thickness diminishes as they rise to the vertex have less thrust than those whose thickness is equal throughout.

6. Semicircular and segmental arches whose extrados is a horizontal line have less thrust than others.

7. The Metropolitan Building Act requires that a brick arch under a public way of a span not more than 10 feet be at least $8\frac{1}{2}$ inches thick, and of a span not more than 15 feet to be at least 13 inches thick.

Approximate Rules for the Thickness of Arches and Abutments. (Hurst and others.)

D = Depth or thickness of crown in feet.
H = Height of abutment to springing in feet.
R = Radius of arch at crown in feet.
T = Thickness of abutment in feet.
W = Weight of 1 foot in length of half arch in cwts.
n = Constant.

$$D = n\sqrt{R}$$

Single arches :—		Series of arches :—	
Block stone	$n = \cdot 3$	Block stone	$n = \cdot 35$
Brick ..	$n = \cdot 4$	Brick ..	$n = \cdot 45$
Rubble ..	$n = \cdot 45$	Rubble ..	$n = \cdot 5$

$$T = \sqrt{\tfrac{1}{5}R^2 + \tfrac{3}{5}R^{\frac{3}{2}} + \left(\frac{W}{H}\right)^2} - \frac{W}{H}.$$

This formula gives the thickness T of abutment, without wing-walls or counterforts, just sufficient to balance the thrust of the half arch, the depth at the crown being equal to $\cdot 4\sqrt{R}$, and the material in the arch and abutment being the same.

RULE SOMETIMES USED FOR RAILWAY BRIDGES.

For spans between 25 and 70 feet—Rise $= \frac{S}{5}$

Thickness of arch $= \frac{S}{18}$

Thickness of abutments $\frac{S}{5}$ to $\frac{S}{4}$

Thickness of pier $\frac{S}{6}$ to $\frac{S}{7}$

Batter (if any) 1 inch to the foot.

TABLE OF THE THICKNESS REQUIRED FOR THE CROWNS OF ARCHES. (Hurst.)

Radius of Curvature.	Stone Arches.	Brick Arches.	Radius of Curvature.	Stone Arches.	Brick Arches.	Radius of Curvature.	Stone Arches.	Brick Arches.
feet.	feet.	feet.	feet.	feet.	feet.	feet.	feet.	feet.
2	·42	·56	14	1·12	1·50	60	2·33	3·10
2½	·47	·63	15	1·16	1·55	65	2·42	3·22
3	·52	·69	16	1·20	1·60	70	2·51	3·35
3½	·56	·75	17	1·24	1·65	75	2·60	3·46
4	·60	·80	18	1·27	1·70	80	2·68	3·58
4½	·64	·85	19	1·32	1·74	85	2·77	3·69
5	·67	·90	20	1·34	1·79	90	2·85	3·80
5½	·71	·94	22	1·41	1·88	95	2·92	3·90
6	·74	·98	24	1·47	1·96	100	3·00	4·00
7	·80	1·06	25	1·50	2·00	110	3·15	4·20
8	·85	1·13	30	1·64	2·19	120	3·29	4·38
9	·90	1·20	35	1·78	2·37	130	3·42	4·56
10	·95	1·26	40	1·90	2·53	140	3·35	4·73
11	1·00	1·33	45	2·01	2·68	150	3·67	4·90
12	1·04	1·38	50	2·12	2·83	160	3·80	5·06
13	1·08	1·44	55	2·22	2·97	170	4·18	5·58

ARCHITECTS' CHARGES.

A Schedule of Rules

For Professional Practice, and Charges of Architects. Published under the sanction of the Royal Institute of British Architects, and confirmed at a General Conference of Architects of the United Kingdom, 1872.

1. The usual remuneration for an architect's services, except as hereinafter mentioned, is a commission of 5 per cent. on the total cost of the works executed from his designs; besides which, all travelling and other incidental expenses incurred by the architect are paid by the employer, who may be also charged for time occupied in travelling if the work be executed at a considerable or inconvenient distance, or if more than ordinary personal attendance is required.

2. But for all works in which the expenditure is mainly for skilled labour and not for materials, *e.g.* in designs for the fittings and furniture of buildings, for their decoration with painting or mosaic, for their sculpture, for stained glass, and other like work, the architect's charge is not made by way of commission on the cost, but should be regulated by special circumstances and conditions.

3. When several similar but distinct buildings are erected at the same time from a single specification and one set of drawings, and under one contract, the commission of 5 per cent. should be charged on the cost of one such building, and a modified arrangement should be made in respect of the others.

4. In works of small value, say 500*l.* in amount, 5 per cent. is not remunerative, and the charge should be by time or by an ascending scale, reaching 10 per cent. for works under 100*l.*

5. The commission is reckoned upon the total cost of the works, valued as if executed by a builder, and of new materials. $2\frac{1}{2}$ per cent. is charged upon any works originally included in the contract, but subsequently omitted in execution.

This is exclusive of the charge for measuring extras and omissions.

6. The architect is entitled during the progress of the building to payment on account at the rate of 5 per cent. on the instalments paid to the builder, or otherwise to half the commission on the signing of the contract, or the commencement of the works, and the remainder by instalments as above.

N.B. The terms of payment adopted by Her Majesty's Office of Works and Public Buildings may also be taken as an equitable method of payment on account, *viz.* :—

One-third part of the commission shall be paid to the architect immediately after the signing of the contract;

One-third part shall be paid to the architect as soon as one-half of the contract sum has been paid to the builder;

And the remaining one-third part shall be paid to the architect after the final payment to the builder.

7. The above charges do not cover professional services in connection with negotiations for site,

in surveying it and taking levels, in making surveys and plans of buildings to be altered, in arrangements respecting party walls, or right of lights, nor services incidental to arrangements consequent upon the failure of builders whilst carrying out work, or in case of subsequent litigation; but all such services are charged for in addition.

8. If the employer, after having agreed to a design, and had the contract drawings prepared, should have material alterations made, whether before or after the contract is prepared, an extra charge should be made, unless such alterations are rendered necessary by an unreasonable excess in the builder's tender beyond the architect's approximate estimate.

9. If the architect should have drawn out the approved design complete, with plans, elevations, sections, and specification, the charge is half the commission upon the estimated cost. If he should, in addition, have procured tenders in accordance with the instructions of his employer, the charge is one-half per cent. extra.

10. For works in the alteration of premises, a special charge may be made on account of the special difficulties and trouble generally involved.

11. The following are the professional services included in the ordinary charge of 5 per cent.:—

The requisite preliminary sketches, drawings, and specifications sufficient for an estimate and contract.

Detailed drawings and instructions for execution.

One set of tracings and duplicate specification.

General superintendence of works (exclusive of clerk of the works).

Examining and passing the accounts, exclusive of measuring and making out extras and omissions.

12. No additional remuneration is due for making an approximate estimate, such as may be obtained, for instance, by cubing out the contents. If a detailed estimate be required by the employer, an additional percentage charge may be made.

13. The charge per day made by architects depends upon their professional position, the minimum charge being three guineas per day.

14. The above payments alluded to in this document are to be made by the employer to the architect, who is not to receive commission or payment of any kind from the builder, or any tradesman, in respect of works executed under the architect's direction.

15. When an architect supplies builders with quantities, on which to form tenders for executing his designs, he should do so with the concurrence of his employer, and it is desirable, when practicable, that the architect should be paid by him rather than by the builder, the cost of such extra labour not being included in the commission of 5 per cent.

16. In respect of the ownership of drawings and specifications, it has hitherto been the general custom for the architect to be paid for their use only, those documents remaining his property.

N.B.—In case of sketches for works abandoned, this custom is recognized by the office of Her Majesty's Works and Public Buildings. No authoritative decision in the Courts of Law has, how-

ever, as yet been given on the subject: it is therefore desirable, for the present at least, that the architect should have a distinct understanding with his employer on this point.

ESTATES.

17. The charge for taking a plan of an estate, laying it out, and arranging for building upon it, should be regulated by the time, skill, and trouble involved.

18. For actually letting the several plots (in ordinary cases) a sum not exceeding a whole year's ground rent may be charged.

19. For inspecting the buildings during their progress (so far as may be necessary to ensure the conditions being fulfilled) and finally certifying for lease, the charge should be a percentage not exceeding one-half per cent. up to 5000*l.*, and above that by special arrangement.

20. All the above fees to be exclusive of travelling expenses, and time occupied in travelling as before mentioned.

21. The charge for the above does not include the commission for preparing specification, directing, superintending, and certifying the proper formation of roads, fences, and other works executed at the cost of the employer, nor for putting the plans on the leases.

VALUATIONS.

22. The following definite charges are recognized for valuation of property:—

The charge throughout is 1 per cent. on the first 1000*l.*, and half per cent. on the remainder up to 10,000*l.* Below 1000*l.* and beyond 10,000*l.* by

special arrangement. These charges do not include travelling expenses, nor attendance before juries, arbitrators, &c.

Dilapidations.

23. The charge for estimating dilapidations is 5 per cent. on the estimate, and in no case less than two guineas.

BRICKLAYERS' MEMORANDA.

Size and Weight of Bricks.

	Length in ins.	Breadth in ins.	Thickness in ins.	Weight each.	Weight per 1000.
				lbs.	cwt.
London stocks ..	$8\frac{3}{4}$	$4\frac{1}{4}$	$2\frac{3}{4}$	6·8	$60\frac{3}{4}$
Red kiln	$8\frac{3}{4}$	$4\frac{1}{4}$	$2\frac{3}{4}$	7·	63
Paving	9	$4\frac{1}{2}$	$1\frac{3}{4}$	5·	45
Dutch clinkers ..	$6\frac{1}{4}$	3	$1\frac{1}{2}$	1·5	14

$1\frac{1}{2}$ brick or 13 inches is the standard thickness.

1 rod of brickwork = 272 feet superficial of standard thickness.
" " = 408 feet superficial, 1 brick thick.
" " = 306 cubic feet, *viz.* 235 feet cub. of bricks and 71 feet cub. of mortar.
" " = $11\frac{1}{3}$ cubic yards.
" " requires 4300 stock bricks laid in mortar, or
" " " 5370 ditto laid dry.
" " " 4900 stock bricks laid dry in wells and circular cesspools.

1 rod of brickwork requires 1 cubic yard of stone lime and $3\frac{1}{2}$ yards of sand.
" " " $1\frac{1}{2}$ cubic yard of chalk lime and 3 yards of drift.
" " " 36 bushels cement and 36 bushels of sand.
" " " about 126 gallons of water to slake the lime and mix the mortar.
" " weighs about 14 tons.

To reduce brickwork from superficial feet of 9 inches thick, or 1 brick, to standard thickness, deduct $\frac{1}{3}$rd.

To reduce brickwork from cubic feet to superficial feet of standard thickness, deduct $\frac{1}{9}$th.

Bricks absorb about $\frac{1}{15}$th their weight in water.

1000 bricks closely stacked occupy about 55 cubic feet.

1 sup. ft. of reduced brickwork requires 16 bricks.
" of gauged arches requires 10 bricks.
" of facings requires 7 bricks.

1 sup. yard of brick nogging requires 45 stock bricks laid flat and $\frac{3}{4}$ cub. foot mortar.
" of brick nogging requires 30 stock bricks on edge, and $\frac{1}{2}$ cub. foot mortar.
" of paving requires 36 stock bricks laid flat.
" " " 52 stock bricks laid on edge.

1 sup. yard of paving requires 36 paving bricks laid flat.
" " " 90 paving bricks on edge.
" " " 13 10-in. tiles or 9 12-in. tiles.
" " " 125 Dutch clinkers laid flat.
" " " 140 Dutch clinkers, on edge.
" " " 136 Dutch clinkers, herring-bone.

330 stock bricks	weigh	1 ton.
1000 "	"	$60\frac{3}{4}$ cwt.
1000 red kiln bricks	"	63 "
1000 paving "	"	45 "
1000 Dutch clinkers, $6\frac{1}{4}$ in. × 3 in. × $1\frac{1}{2}$ in.	"	14 "
1000 paving tiles, 6 in. × 6 in. × 1 in.	"	$19\frac{1}{4}$ "
1000 ditto, $9\frac{3}{4}$ in. × $9\frac{3}{4}$ in. × 1 in.	"	$2\frac{1}{2}$ tons.

500 bricks = 1 cart load.

27 hods of mortar = 1 yard.

A bricklayer's hod measures 16 in. × 9 in. × 9 in.
" " will hold 20 bricks.
" " " $\frac{2}{3}$rds cubic foot of mortar.
" " " $\frac{1}{2}$ bushel (nearly).

Lime, sand, and cement required for 1 rod of brickwork:—

Dorking lime	36	cubic feet.
Sand	72	
Blue Lias lime	38	"
Sand	77	

Portland or Roman cement	45	cubic feet.
Sand	45	

Pointing brickwork requires:—

For flat joint, $\frac{1}{5}$th cub. foot of mortar per yard sup.

Tuck ..	$\frac{1}{8}$th	,,	,,	,,
	$\frac{1}{8}$th	,,	putty	,,

BRICKWORK.

In dry weather the bricks should be thoroughly soaked before laying. Each course of bricks should be fully flushed with mortar, and every fourth course should be grouted, for strong work.

BRICKS, quality of.

Well-burnt bricks will give a clear ringing sound when clapped together; but some facing bricks, which do not ring like a stock brick, are found to harden by exposure, and stand the weather well.

STRENGTH OF BRICKWORK. (From Experiments.)

Cubitt.	Yielded to	Crushed by	Remarks.
	tons.	tons.	
Good place bricks ..	11	16½	Bedded on plaster.
,, ,, ..	16	22	,, ,,
Two common stocks ..	10	16	No plaster.
Good stock	30	34	
Superior washed ditto	36	44½	
Ordinary place brick ..	3	9	

A pressed and kiln-burnt stock, made for superior purposes, ground on both sides to get a true bed, *bore a pressure of* 60 *tons* (the limit of the power of the ram used), *and was taken out sound and uninjured.* A similar brick, *not* ground, but faced with plaster, resisted the same pressure without crushing, but was slightly broken at the edges.

Weight of Brickwork.

	Weight of a cubic foot.	Cubic feet = 1 Ton.
	lbs.	
Brickwork in mortar	100	$22\frac{3}{4}$
" cement	110	$20\frac{2}{3}$

Size of Roman Bricks.

('Glossary of Architecture.')

Where found.	Length.		Breadth.		Thickness.
	in.		in.		in.
Bognor, Sussex	8	×	8	×	1
" "	8	×	1	×	$1\frac{1}{4}$
" "	11	×	11	×	$1\frac{1}{4}$
" "	13	×	$10\frac{1}{4}$	×	$1\frac{1}{2}$
St. Albans	18	×	12	×	$1\frac{3}{4}$
Eynesford Castle, Kent	$8\frac{1}{2}$	×	8	×	2
" "	14	×	$11\frac{1}{4}$	×	$1\frac{5}{8}$
" "	16	×	$11\frac{1}{2}$	×	$1\frac{3}{8}$
Autun, France	$17\frac{1}{4}$	×	$12\frac{1}{2}$	×	$2\frac{1}{2}$
Tours	14	×	12	×	$1\frac{1}{2}$
Lillebonne	$8\frac{1}{4}$	×	$8\frac{1}{4}$	×	$1\frac{1}{4}$

Some of the Roman bricks are deeply scratched on the surface for the purpose of making the mortar adhere to them.

Pounded bricks were used in the mortar, which gave it a reddish colour.

BOND in brickwork.

English bond (which is the strongest) is a

course of stretchers and a course of headers alternately, or one course of headers and one course of stretchers.

Flemish bond is a header and stretcher laid alternately in the same course.

Hoop-iron bond (Tyerman's patent has the edges notched, which increases its utility) should be well tarred and sanded, and should be bedded in cement.

Flemish bond was introduced into England in the time of William III.; previous to that period old English bond was used.

CARPENTERS' MEMORANDA.

A load of timber contains 50 cubic feet.

120 deals = one hundred.

100 feet super. = to a square of boarding or flooring.

400 feet super. of $1\frac{1}{2}$-in. deal = to one load.

600 ,, 1-in. ,, ,,

100 12-ft. 3-in. deals, 9 in. wide = to $5\frac{2}{3}$ loads.

100 12-ft. $2\frac{1}{2}$-in. ,, ,, ,, $4\frac{1}{2}$,,

Battens are 7 in. wide.

Deals ,, 9 ,, ,,

Planks ,, 11 ,, ,,

A deal when reduced is 12 ft. long, 11 in. wide, and $1\frac{1}{2}$ in. thick.

45	cubic feet of	ash	equal 1 ton.
51	,,	beech	,,
66	,,	deals	,,
60	,,	elm	,,
64	,,	fir	,,
35	,,	mahogany	,,
39	,,	oak	,,

With 12-ft. deals a square of flooring requires :—

13 boards if wrought and laid folding.
$13\frac{1}{2}$,, if laid straight joint.
14 ,, ,, ,, ,, and ploughed and tongued.

Or to the square there are required :—

20 12-ft. boards to a 5-in. gauge.
16 ,, ,, ,, 6 ,, ,,
14 ,, ,, ,, 7 ,, ,,

Materials for deal mouldings about equal the labour.

Four score of 6-ft., 5 score of 5-ft., and 6 score of 4-ft. cleft oak pales go to the hundred.

Strength of Timber.

The strength of a piece of timber *fixed* at both ends, and loaded in the middle, is to that of a like piece only *supported* at both ends and loaded in the middle as 3 to 2; that is, the first will bear one-third more weight than the second.

The duties of king post and queen post being suspension, they may be efficiently, and in some cases advantageously, replaced by wrought-iron rods; from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. diameter will in almost any case be sufficient.

Tenon and Mortise.

The size or sectional area of the mortise should be exactly equal to that of the tenon, but the depth of the mortise should rather exceed that of the tenon, so that the weight may bear on the shoulders and not on the head of the tenon.

DEAL STANDARDS.—TABLE SHOWING THE CUBICAL CONTENTS OF PLANKS, DEALS, AND BATTENS.

Length in feet.	Battens, 7 in. × 3 in.	Battens, 7 in. × 2½ in.	Deals, 9 in. × 3 in.	Deals, 9 in. × 2½ in.	Planks, 11 in. × 3 in.	Planks, 11 in. × 2½ in.
	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.
8	1 2 0	0 11 8	1 6 0	1 3 0	1 10 0	1 6 4
10	1 5 6	1 2 7	1 10 6	1 6 9	2 3 6	1 10 11
12	1 9 0	1 5 6	2 3 0	1 10 6	2 9 0	2 3 6
14	2 0 6	1 8 5	2 7 6	2 2 3	3 2 6	2 8 1
16	2 4 0	1 11 4	3 0 0	2 6 0	3 8 0	3 0 8
18	2 7 6	2 2 3	3 4 6	2 9 9	4 1 6	3 5 3
20	2 11 0	2 5 2	3 9 0	3 1 6	4 7 0	3 9 10

TABLE SHOWING THE NUMBER OF EACH EQUAL TO A LOAD OF TIMBER 50 CUBIC FEET.

8	43	51½	33½	40	27¼	32¾
10	34¼	41¼	26¾	32	22	26
12	28¾	34¼	22¼	26¾	18¼	22
14	24½	29½	19	23	15¾	18¾
16	21½	25¾	16¾	20	13¾	16¼
18	19	23	15	17¾	12¼	14½
20	16¾	20¾	13½	16	11	13

The price of timber in scantlings, at 3*s.* per cubic foot, is equal per foot run to one farthing per square inch of sectional area.

Example at 3s. per Foot Cube.

Scantlings.			
4 in. × 3 in. = 12 at $\frac{1}{4}d.$ =	3*d.*	per foot run.
6 in. × 4 in. = 24 „ $\frac{1}{4}d.$ =	6*d.*	„
12 in. × 6 in. = 72 „ $\frac{1}{4}d.$ =	1*s.* 6*d.*	„

Deal Standards.

	Length.	Breadth.	Thickness.	Contents.
	ft.	ins.	ins.	Cubic ft. in. pts.
Russia and Prussia	12	11	$1\frac{1}{2}$	1 4 6
Sweden	14	9	3	2 7 6
Quebec	12	11	$2\frac{1}{2}$	2 3 6
Christiana ..	11	9	$1\frac{1}{4}$	0 8 5
Norway	12	9	3	2 3 0
Dram	10	—	$1\frac{1}{2}$	——

16 feet 6 run = 1 rod fencing.

To find the value of timber per foot cube from the prime cost per load,

Rule.—To the price of the timber at the yard add 1*l.* per load for sawing and carting, and multiply the number of pounds by $6\frac{1}{2}d.$, which will give the price per cubic foot, with 20 per cent. for profit and waste.

Example—

	£	s.	d.	
Prime cost at yard	3	0	0	per load.
Sawing and cartage	1	0	0	„
	4	0	0	
	0	0	$6\frac{1}{2}$	
	0	2	2	per ft. cube.

TABLE SHOWING THE VALUE PER FOOT RUN OF TIMBER CUT TO SCANTLINGS AT THE RATE OF 3s. PER FOOT CUBE.

Ins.	2	2½	3	3½	4	4½	5	5½	6	6½	7	8	9	10	11	Ins.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
12	0 6	0 7½	0 9	0 10½	1 0	1 1½	1 3	1 4½	1 6	1 7½	1 9	2 0	2 3	2 6	2 9	12
11½	0 5¾	0 7¼	0 8¾	0 10	0 11½	1 1	1 2½	1 3¾	1 5¼	1 6¾	1 8¼	1 11	2 2	2 4¾	2 7¾	11½
11	0 5½	0 7	0 8¼	0 9¾	0 11	1 0½	1 1¾	1 3	1 4½	1 6	1 7¼	1 10	2 0¾	2 3½	2 6¼	11
10½	0 5¼	0 6¾	0 8	0 9¼	0 10½	1 0	1 1¼	1 2½	1 3¾	1 5	1 6½	1 9	2 0	2 2¼	—	10½
10	0 5	0 6¼	0 7½	0 8¾	0 10	0 11¼	1 0½	1 1¾	1 3	1 4¼	1 5½	1 8	1 10½	2 1	—	10
9½	0 4¾	0 6	0 7¼	0 8½	0 9½	0 10¾	1 0	1 1	1 2¼	1 3½	1 4¾	1 7	1 9¼	—	—	9½
9	0 4½	0 5¾	0 6¾	0 8	0 9	0 10¼	0 11¼	1 0¼	1 1½	1 2¾	1 3¾	1 6	1 8¼	—	—	9
8½	0 4¼	0 5¼	0 6½	0 7½	0 8½	0 9½	0 10¾	0 11½	1 0¾	1 2	1 3	1 5	—	—	—	8½
8	0 4	0 5	0 6	0 7	0 8	0 9	0 10	0 11	1 0	1 1	1 2	1 4	—	—	—	8
7½	0 3¾	0 4¾	0 5¾	0 6¾	0 7½	0 8½	0 9½	0 10¼	0 11¼	1 0¾	1 1¼	—	—	—	—	7½
7	0 3½	0 4½	0 5¼	0 6¼	0 7	0 8	0 8¾	0 9¾	0 10½	0 11½	1 0½	—	—	—	—	7
6½	0 3¼	0 4¼	0 5	0 5¾	0 6½	0 7¼	0 8¼	0 9	0 9½	0 10½	—	—	—	—	—	6½
6	0 3	0 3¾	0 4½	0 5¼	0 6	0 6¾	0 7½	0 8¼	0 9	—	—	—	—	—	—	6
5½	0 2¾	0 3½	0 4¼	0 4¾	0 5½	0 6¼	0 7	0 7½	—	—	—	—	—	—	—	5½
5	0 2½	0 3¼	0 3¾	0 4½	0 5	0 5¾	0 6½	—	—	—	—	—	—	—	—	5
4½	0 2¼	0 2¾	0 3½	0 4	0 4½	0 5½	—	—	—	—	—	—	—	—	—	4½
4	0 2	0 2½	0 3	0 3½	0 4	—	—	—	—	—	—	—	—	—	—	4
3½	0 1¾	0 2¼	0 2¾	0 3	—	—	—	—	—	—	—	—	—	—	—	3½
3	0 1½	0 2	0 2¼	—	—	—	—	—	—	—	—	—	—	—	—	3
2½	0 1¼	0 1½	—	—	—	—	—	—	—	—	—	—	—	—	—	2½
2	0 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2

CASTINGS.

To find the weight of castings from the pattern, multiply weight of deal pattern by 17 for cast iron.

"	"	"	"	18	"	brass.
"	"	"	"	19	"	copper.
"	"	"	"	25	"	lead.

CEMENTS. (Haswell.)

Hydraulic cements contain a larger proportion of silica, alumina, magnesia, &c., than hydraulic limes. They do not slake after calcination, and some of them set under water at a temperature of 65° in from 3 to 5 minutes; others require as many hours.

*Roman cement** is made from a lime of a peculiar character found in England and France, derived from argillo-calcareous kidney-shaped stones termed "Septaria," and when mixed thick it solidifies in a few minutes, either in air or water.

1. *Portland cement* is made in England and France, from an argillo-calcareous deposit, which is burned and ground up for cement in its natural state, without the addition of lime.

2. Strong Portland cement is heavy, weighing 110 lbs. to the bushel. Weak cement is light.

3. Strong cement is of a blue-grey colour, and sets slowly. Weak cement sets quickly, has too much clay in it, and is of a brownish colour.

4. The cleaner and sharper the sand, and the less water used in mixing the cement, the stronger it will be.

* Roman cement is only about ⅓rd the strength of Portland cement.

5. At the end of one year after setting 1 of sand and 1 of cement is about $\frac{3}{4}$ths the strength of neat cement.

2 of sand and 1 of cement is about $\frac{1}{2}$ the strength of neat cement.

3 of sand and 1 of cement is about $\frac{1}{3}$rd the strength of neat cement.

4 of sand and 1 of cement is about $\frac{1}{4}$th the strength of neat cement.

5 of sand and 1 of cement is about $\frac{1}{6}$th the strength of neat cement.

6. Portland cement, as employed in metropolitan drainage works, weighs 110 lbs. to the bushel, and maintains a breaking weight of 500 lbs. on $1\frac{1}{2}$ square inch, seven days after being made, and immersed in water during the seven days.

---

1 cask of Portland cement = 4 bushels (nominally).

1 cask of Roman cement = 5 bushels (nominally).

1 cask of Portland cement holds 5 cubic feet, and weighs $3\frac{3}{4}$ cwt.

1 cask of Roman cement holds $3\frac{3}{4}$ cubic feet (but they can be made to hold $3\frac{1}{2}$ bushels), and the weight is $3\frac{1}{2}$ cwt.

	Thickness.		
	1 in.	$\frac{3}{4}$ in.	$\frac{1}{2}$ in.
	yards.	yards.	yards.
1 bushel of cement will cover.. ..	$1\frac{1}{7}$	$1\frac{1}{2}$	$2\frac{1}{4}$
1 bushel of cement and 1 of sand will cover	$2\frac{1}{4}$	3	$4\frac{1}{2}$
1 bushel of cement and 2 of sand will cover	$3\frac{1}{2}$	$4\frac{1}{2}$	$6\frac{3}{4}$

CHAINS.

To find the breaking weight, divide the square of the diameter of one bar of the link in sixteenths of an inch by 9.

SAFE WORKING LOAD OF CHAINS.

Diameter of Iron.	Working Load.	Diameter of Iron.	Working Load.
inch.	tons.	inch.	tons.
$\frac{3}{8}$	1	$\frac{15}{16}$	6·2
$\frac{1}{2}$	1·7	1	7
$\frac{9}{16}$	2·2	$1\frac{1}{16}$	8
$\frac{5}{8}$	2·8	$1\frac{1}{8}$	9
$\frac{11}{16}$	3·3	$1\frac{3}{16}$	10
$\frac{3}{4}$	4	$1\frac{1}{4}$	11
$\frac{13}{16}$	4·6	$1\frac{5}{16}$	12
$\frac{7}{8}$	5·5	$1\frac{3}{8}$	13·5

CHIMNEYS.

Chimneys in an outside wall are more liable to smoke than those built in an inside wall, and the back of a chimney so built should not be less than 14 inches thick.

All chimneys should be carried 6 or 7 feet above the ridge of roof.

Short chimneys should be smaller than the usual size, and the fire-place should be kept low.

See also Smoky Chimneys, p. 32.

SMOKY CHIMNEYS. (Edwards.)

Chimneys that smoke in consequence of a descending current existing or being produced in the chimney.

Causes.	*Remedies.*
From a fire-place being too open.	To contract the size of the fire-place, or use a contracted grate.
From a chimney being very short.	To use a contracted grate with a blower; to reduce the height of the fire-place and the size of the chimney; to lengthen the chimney; to reduce the opening into the chimney at top and bottom.

Chimneys that smoke in consequence of a descent of wind.

Causes.	*Remedies.*
From the top of a chimney being below a pitched roof.	To heighten the flue that its top may be above the source of obstruction.
From the top of a chimney being situated near to a tower, or a similar source of obstruction to the wind.	To use a simple protection, to cover the top of flue

See also Chimneys, p. 31.

CHURCHES.

Thickness of Walls required by the Incorporated Society for Promoting Building, &c., of Churches.

	Dressed Stone, the best quality, or brick.	Brick, faced with Flint or Stone, or inferior Stone, Flint, or Rubble.
	ft. in.	ft. in.
If less than 20 feet high, and carrying a roof not exceeding 20 feet span	1 10½	2 3
If 20 feet high and under 30 feet, or carrying a roof exceeding 20 feet span	2 3	2 6
If more than 30 feet high	2 7½	3 0

Note.—The arcade walls being measured from the caps of the piers, and the gable walls from the ground level to half the height of roof.

Space between front seats in chancel to be 6 feet where span is under 13 feet, and not less than 8 feet when that span is exceeded.

Passage up the whole length of the centre of church not less than 3 feet 6 inches wide where the width of nave is under 18 feet, and 4 feet when this width is exceeded.

Distance between seats:—not less than 2 feet 9 inches from centre to centre of backs when backs are perpendicular, and not less than 2 feet 10 inches when backs are sloping. 3 feet is recommended as distance from centre to centre of seats.

Seats:—20 inches in length for each adult.
14 ,, ,, ,, child.

Seats intended exclusively for children to be at least 26 inches from back to front.

CIRCLE.

PROPERTIES OF THE CIRCLE.

Diameter .. × 3·14159 = circumference.
Diameter .. × ·886226 = side of an equal square.
Diameter .. × ·7071 = side of an inscribed square.
Diameter^2 .. × ·7854 = area of circle.
Radius .. .. × 6·28318 = circumference.
Circumference × ·31831 = diameter.
Circumference = 3·5446 $\sqrt{\text{area of circle}}$.
Diameter .. = 1·1283 $\sqrt{\text{area of circle}}$.
Length of arc = number of degrees × ·017453 radius.

COAL.

SPACE OCCUPIED BY 1 TON.

	cubic feet.
Welsh	39 to 43
Lancashire	44
Newcastle	45
Scotch	43
Navy allowance	48

WEIGHT OF COAL PER CUBIC FOOT.

	lbs.
Welsh	53 to $58\frac{1}{4}$
Lancashire	50
Newcastle	50
Scotch	53

COLUMNS, Strength of. (Hodgkinson.)

W = Breaking weight in tons.
L = Length of column in feet.
D = External diameter of column in inches.
d = Internal ,, ,, ,,

Nature of Column.	Both ends rounded when L exceeds 15 D.	Both ends flat when L exceeds 30 D.
Solid cylinders of cast iron	$W = 14 \cdot 9 \frac{D^{3 \cdot 76}}{L^{1 \cdot 7}}$	$W = 44 \cdot 16 \frac{D^{3 \cdot 55}}{L^{1 \cdot 7}}$
Hollow ditto	$W = 13 \frac{D^{3 \cdot 76} - d^{3 \cdot 76}}{L^{1 \cdot 7}}$	$W = 44 \cdot 34 \frac{D^{3 \cdot 55} - d^{3 \cdot 55}}{L^{1 \cdot 7}}$
Solid square of Dantzic oak (dry)	.. .. ..	$W = 10 \cdot 95 \frac{D^4}{L^2}$
Solid square of red deal (dry)	.. .. ..	$W = 7 \cdot 81 \frac{D^4}{L^2}$

Cast-iron Columns. (Hurst.) $\frac{1}{10}$th of Breaking Weight in tons of *Solid* Columns, ends flat and fixed.

Diam. in inches.	Length of Column in feet.								
	6	8	10	12	14	16	18	20	25
1½	·82	·50	·34	·25	·19	·15	·13	·11	..
2	2·31	1·41	·97	·71	·55	·44	·36	·30	..
2½	5·15	3·16	2·16	1·58	1·22	·97	·80	·66	..
3	9·93	6·09	4·17	3 06	2·35	1·87	1·53	1·28	..
3½	17 29	10·60	7·26	5·32	4·10	3·26	2·67	2·23	..
4	27·96	17·15	11·73	8·61	6 62	5·28	4·32	3·61	..
4½	42·73	26·20	17·93	13·15	10·12	8·07	6·60	5·52	..
5	62·44	38·29	26·20	19·22	14·79	11·79	9·65	8·06	5·52
5½	88·00	53·97	36·93	27·09	20·84	16·61	13·60	11·37	7·78
6	120·4	73·82	50·51	37·05	28·51	22·72	18·60	15·55	10·64
6½	160·6	98·47	67·38	49·43	38·03	30·31	24·81	20·74	14·19
7	209·7	128·6	87·98	64·53	49·66	39·57	32·39	27·08	18·53
7½	268·8	164·8	112·8	82·73	63·66	50·73	41·53	34·72	23·76
8	339·1	207·9	142·3	104·4	80·31	64·00	52·39	43·80	29·97
8½	421·8	258·6	177·0	129·8	99·90	79·61	65·16	54·48	37·28
9	518·2	317·7	217·4	159·5	122·7	97·80	80·05	66·92	45·80
9½	629·5	386·0	264·2	193·8	149·1	118·8	97·25	81·70	55·64
10	757·2	464·3	317·7	233·1	179·3	142·9	117·0	97·79	66·92
10½	902·6	553·5	378·7	277·8	213·8	170·3	139·4	116·6	79·77
11	1067·1	654·4	447·8	328·5	252·7	201·4	164·9	137·8	94·31
11½	1252·3	767·9	525·5	385·4	296·6	236·4	193·5	161·7	110·7
12	1459·6	895·1	612·5	449·3	345·7	275·5	225·5	188·5	129·0

Cast-iron Hollow Columns.—Safe Load at $\frac{1}{10}$th Breaking Weight.

External Diameter.	Thickness of Metal.	Length in feet. 8	10	12	14	16
in.	in.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.
3	½	4 0	3 4	2 6	1 15	1 8
3	¾	5 7	3 15	2 15	2 4	1 12
4	½	8 0	6 0	4 12	3 10	3 5
4	¾	11 5	8 10	6 10	4 15	3 15
5	½	13 5	10 7	8 5	6 12	5 6
5	¾	18 15	14 15	11 12	9 0	7 12
5	1	23 10	18 10	14 15	11 16	9 10
6	½	19 0	15 10	12 12	9 10	8 13
6	¾	27 0	22 5	18 5	15 0	12 10
6	1	34 10	28 5	23 3	19 0	15 15
7	¾	36 0	30 10	25 15	21 12	18 6
7	1	46 3	39 0	33 0	27 15	23 10
7	1¼	55 5	46 15	39 10	33 3	28 4
8	¾	45 0	39 2	34 0	29 0	25 0
8	1	58 5	50 10	43 12	37 10	32 8
8	1¼	70 0	61 0	51 10	45 5	39 0
9	1	—	61 10	54 5	47 0	41 5
9	1¼	—	74 10	65 12	57 5	50 4

CONCRETE BUILDING. ('Builder.')

MATERIALS.—Half measure of Portland cement; half measure of air-slaked lime sifted through a fine sieve, mixed together dry. Seven measures of sand and gravel, if possible of all degrees of fineness, from peas to large eggs, or stones broken to pass through a 2-inch ring; the finer should just fill the intervals of the coarser materials; then all to be mixed together dry and measured. The mixture of cement and lime to be then added and mixed dry, and the whole tempered with as little water as possible; any more than will just moisten the whole is in excess. No wall-plates or timbers should be bedded *in* concrete walls.

CONCRETE under Water. (Crawford.)

The result of a series of experiments, for the purpose of ascertaining the best description of concrete to be placed round the foundations of the river piers (Görlitz, Prussia), gave the proportions most suitable for yielding a quick-setting hard concrete at

22	per cent.	of cement.
22	,,	sand.
56	,,	small broken stones (2 inches in diameter).
100		

A good concrete is made as follows:—

Screened gravel	$4\frac{2}{3}$
Sharp sand	$2\frac{1}{3}$
Blue lias lime	1
Total	8 parts,

mixed dry, and just as much water as will moisten

the whole added, the whole substance to be then thoroughly mixed and thrown into the trenches whilst hot.

Concrete should be mixed in small quantities at a time and used fresh.

See also page 243 *et seq.*

CORRUGATED IRON

Is usually made in sheets 6 feet to 8 feet long, and 2 feet to 3 feet wide.

CORRUGATED IRON ROOFING.

B. Wire Gauge.	Size of Sheets.	Weight per square.			Sq. feet per ton.
	feet.	cwt.	qrs.	lbs.	
No. 16 ..	6×2 to 8×3	3	0	14	800
„ 18 ..	6×2 to 8×3	2	1	6	1000
„ 20 ..	6×2 to 8×3	1	3	6	1250
„ 22 ..	6×2 to 7×2½	1	2	7	1550
„ 24 ..	6×2 to 7×2½	1	0	24	1880
„ 26 ..	6×2 to 7×2½	1	0	6	2170

$\frac{1}{10}$th of the weight to be added for lappage.

Sheets should overlap about 6 inches, and be double riveted at joints.

3 lbs. of rivets required per square of roofing.

Purlins should be about 6 feet apart.

Cubical Contents of Timber in Floors, &c.

A Table showing the number of Cubic Feet contained in one Square of Flooring, Roofing, &c., from 3 in. × 2 in. to 12 in. × 4½ in., the pieces being 1 ft. apart.

Inches.	2.		2½.		3.		3½.		4.		4½.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
3	3	8	4	4	5	0	5	8	6	3	6	10
3¼	3	11	4	9	5	6	6	1	6	10	7	5
3½	4	3	5	1	6	0	6	6	7	4	8	0
3¾	4	7	5	5	6	4	7	0	7	11	8	7
4	4	10	5	10	6	8	7	7	8	4	9	2
4¼	5	2	6	2	7	2	8	0	8	11	9	9
4½	5	5	6	6	7	7	8	6	9	5	10	3
4¾	5	9	6	10	8	0	8	11	9	11	10	10
5	6	1	7	3	8	5	9	5	10	5	11	5
5¼	6	4	7	7	8	9	9	11	11	0	12	0
5½	6	8	7	11	9	2	10	4	11	6	12	6
5¾	6	11	8	4	9	7	10	10	12	0	13	1
6	7	3	8	8	10	0	11	4	12	6	13	8
6¼	7	7	9	0	10	5	11	9	13	1	14	3
6½	7	10	9	5	10	10	12	3	13	7	14	10
7	8	5	10	1	11	8	13	2	14	7	16	0
7½	9	1	10	10	12	1	14	1	15	8	17	1
8	9	8	11	6	13	4	14	11	16	8	18	3
8½	10	3	12	3	14	2	15	10	17	9	19	4
9	10	10	13	0	15	0	17	0	18	9	20	6
9½	11	5	13	8	15	10	17	11	19	10	21	8
10	12	1	14	5	16	8	18	10	20	10	22	9
11	13	3	15	10	18	4	20	8	22	11	25	2
12	14	5	17	3	20	0	22	8	25	0	27	5

The upper line and left-hand figures are the dimensions; the ranging figures with the dimensions given is the quantity contained in one square. Plates and braces in quarter partitions to be added, and deductions made for doorways and other openings. An extra joist should be allowed for each room, and extra thickness of trimming joist should be added.

DAMP.

Recipe for Damp Walls.

Take $\frac{3}{4}$ lb. mottled soap to 1 gallon of water, to be applied *boiling* over the surface with a brush (not to be frothed), leave it for 24 hours to dry; then apply $\frac{1}{2}$ lb. of alum to 4 gallons of water, leaving it for 12 hours to dissolve, and to be laid on as before. Hot weather is best for the application.

DAMP COURSE.

It is usual to form a damp course through all walls at about 3 in. or 6 in. above the ground line. Slate (lapped at the joints) and lead are sometimes used for this purpose; but asphalt $\frac{1}{2}$ in. or $\frac{3}{4}$ in. thick is the most efficacious and most economical.

DECAY OF WOOD. (Baron Liebig.)

Causes of Decay.

1. The oxygen in the atmosphere combines with the hydrogen of the fibre, and the oxygen unites with the portion of carbon of the fibre and evaporates as carbonic acid; this is called *decomposition.*

2. The actual decay of the wood which takes place when it is brought into contact with rotting substances.

3. The inner decomposition of the wood in itself by losing its carbon forming carbonic acid gas, and the fibre under the influence of the latter is changed into white dust, which is called *putrefaction.*

A SYNOPTICAL VIEW OF THE LEADING DIMENSIONS OF THE ENGLISH CATHEDRALS. (Gwilt.)

Cathedral.	Total internal Length.	Naves and Aisles.			Choirs.			Transepts.	Spires and Towers.	Height.
		Length.	Breadth.	Height.	Length.	Breadth.	Height.	Breadth.		
Winchester ..	545	247	86	78	138	..	73	186	..	..
Ely	517	327	73	70	101	73	70	178	Tower	210
Canterbury ..	514	214	70	80	150	74	80	154	"	235
York	498	264	109	99	131	..	99	222	"	234
Lincoln ..	498	..	83	83	..	..	..	227	"	260
Westminster	489	130	96	101	152	..	151	189	..	..
Peterborough	480	231	78	78	138	..	78	203	Louvre	150
Salisbury ..	452	246	76	84	140	..	84	210	Spire	387
Durham ..	420	..	..	..	117	33	71	176	Tower	214
Gloucester ..	420	174	84	67	140	..	86	144	"	225
Lichfield ..	411	213	67	..	110	..	67	..	Spire 258 W.	183
Norwich ..	411	230	71	..	165	..	..	191	Spire	317
Worcester ..	410	212	78	..	126	..	74	130	Tower	196
Chichester ..	401	205	91	61	100	..	..	131	Spire	267
Exeter	390	173	74	69	131	..	69	140	Tower	130
Wells	371	191	67	67	106	..	67	135	"	160
Hereford, anct.	370	144	68	68	105	..	64	140	..	..
Rochester ..	306	150	65	..	156	..	..	122	Spire	156
Carlisle.. ..	213	..	71	71	137	71	..	..	..	..
Bristol	175	100	75	73	100	..	..	128	Tower	127
Oxford	154	74	54	41	80	..	37½	102	Spire	184

Dimensions of	Length in feet.	Width in feet.	Height to Ridge in feet.
Westminster Hall, London	238	$67\frac{1}{2}$	90
Guildhall "	153	50	82
Lincoln's Inn "	120	45	60
Whitehall "	110	55	55
Middle Temple "	100	40	50
Mansion House "	90	50	60
St. Stephen's Hall, Westminster	90	30	60
Hampton Court Palace	106	40	60
Eltham Palace	101	36	54
House of Lords	90	45	45
House of Commons	75	45	41

DRAINAGE OF LAND. (Mr. Dempsey.)

Description of Soils.	Distance of drains apart.	Depth of drains.		Number of drain pipes 12 in. long per acre.	Cost of drain tiles per acre, at 30s. per 1000.		
	feet.	ft.	in.		£	s.	d.
Compact or Heavy Soils.							
Compact, tenacious, gravelly clay	15	2	6	2905	4	7	2
Stiff adhesive clay	16½	2	6	2640	3	19	2
Friable clay	18	2	9	2420	3	12	7
Free soft clay	21	2	9	2076	3	2	3
Medium Soils.							
Clayey loam	22	3	0	1980	3	19	5
Marly loam	24	3	0	1814	2	14	6
Gravelly loam	27	3	3	1613	2	8	4
Friable loam	30	3	3	1452	2	3	6
Porous or Light Soils.							
Light gravelly loam	33	3	6	1320	1	19	7
Light marly loam	36	3	9	1209	1	16	3
Sandy loam	39	4	0	1117	1	13	6
Soft light loam	42	4	0	1037	1	11	2
Sandy soil	45	4	0	974	1	9	3
Light gravelly sand	49½	4	3	880	1	7	5
Deep gravelly sand	55	4	3	792	1	3	9
Coarse gravelly sand	60	4	6	726	1	1	9
Loose gravelly sand	66	4	6	660	0	19	10

[DRA

DRAINS AND SEWERS

Provide for removing rainfall from

Roofs	·5	in. in depth per hour.
Flagged areas	·2	,, ,, ,,
Gravelled ,,	·05	,, ,, ,,

Drains and sewers provide for removing 5 cubic feet per head in every 24 hours, one-half of which passes off in about 5 hours.

House drains require a velocity of 3 feet per second to keep them clear, and 2 feet per second is required for sewers.

Rules for Drainage and Sewers. (Rawlinson.)

1. Natural streams should not be arched over to form main sewers.

2. Valley lines and natural streams may be improved so as to remove more readily surface water and extreme falls of rain.

3. Main sewers need not be of capacity to contain flood water of the area drained; such flood water may be passed over the surface in most cases without causing injury.

4. Main sewers should be laid out in straight lines and true gradients from point to point, with manholes, flushings, and ventilating arrangements at each principal change of line and gradient. All manholes should be brought up to the surface of the road or street to allow of inspection, and should be finished with a cover easily removable.

5. Duplicate systems of sewers are not required. Drains to natural streams in valley lines for storm waters may be retained, and may be improved, or if necessary enlarged.

6. Earthenware pipes make good sewers and drains up to their capacity. Pipes must be truly laid and securely jointed. In ordinary ground they may be jointed with clay. In sandy ground special means must be used to prevent sand washing in at the joints.

7. Brick sewers ought to be formed with bricks moulded to the radii.

8. Brick sewers should in all cases be set in hydraulic mortar, or in cement. In no case should any sewer be formed with bricks set dry to be subsequently grouted.

9. Main sewers may have flood-water overflows wherever practicable to prevent such sewers being choked during thunderstorms or heavy rains.

10. Sewers should not join at right angles. Tributary sewers should deliver sewerage in the direction of the main flow.

11. Sewers and drains, junctions and curves, should have extra fall to compensate for friction.

12. Sewers of unequal sectional diameters should not join with level inverts, but the lesser or tributary sewer should have a fall into the main at least equal to the difference in the sectional diameter.

13. Earthenware pipes of equal diameters should not be laid as branches or tributaries; that is, 9 in. leading into 9 in., or 6 in. into 6 in., but a lesser pipe should be joined on to the greater, as 6 in. to 9 in., 12 in. to 15 in., 9 in. to 12 in.

14. House drains should not pass direct from sewers to the inside of houses, but all drains should end at an outside wall. House drains,

sink pipes, and soil pipes should have means of external ventilation. The largest block of buildings may have every sewer outside of the main walls. No foul water drains nor cesspit should be formed beneath any house basement. All fluid refuse should pass at once from the drains to the sewers and from the sewers to the outlet.

15. Sinks and water-closets should be against external walls, so that the refuse water or soil may be discharged into a drain outside the main wall. Down spouts may be used for ventilation, care being taken that the head of such spout is not near a window. Water-closets, if fixed within houses, and having no means of direct daylight and external air ventilation, are liable to become nuisances and may be injurious to health.

16. Inlets to all pipe drains should be properly protected.

17. Sewers having steep gradients should have full means of ventilation at the highest points.

18. Tall chimneys may be used with advantage for sewers and drain ventilation.

Sewers. (Bazalgette.)

For the metropolitan sewers the bricks used are mostly picked stocks, frequently faced with gault clay bricks, and the inverts are occasionally faced with Staffordshire blue bricks. The brickwork as a rule is laid in blue lias lime mortar, mixed in the proportion of 2 of sand to 1 of lime for two-thirds of the upper circumference of the sewers, and the lower third in Portland cement in the proportion of 1 part of cement to 1 part of sand.

FLOW OF WATER IN SEWER. (Molesworth.)

x = Area of sewer ÷ the wetted perimeter in feet.
f = Fall in feet per mile.
V = Velocity in feet per minute.
A = Area in square feet.
C = Cubic feet of water delivered per minute.

$$V = 55\sqrt{x \times 2f}.$$
$$C = V \times A.$$

EGG-SHAPED SEWER.—INTERNAL DIMENSIONS.

Let B = Diameter of bottom of sewer.
C = ,, top ,,
R = Radius of sides ,,
D = Depth of sewer.

$$B = \frac{D}{3}. \qquad C = \frac{2D}{3}. \qquad R = D.$$

When D is less than 6 ft., the brickwork is generally 9 in. thick.

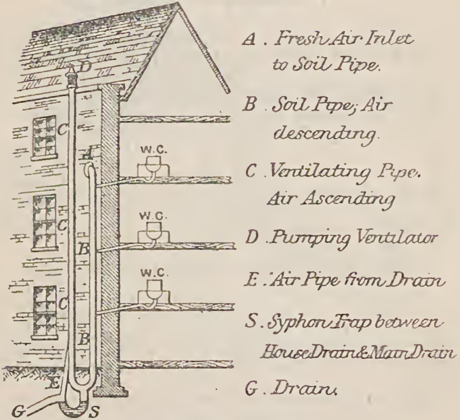
Above 6 ft. and under 9 ft., brickwork 14 in. thick.

DRAINAGE OF TOWNS, COST OF.
(Rawlinson.)

	Population.	Cost of Drainage.	Rate in the £.
		£.	d.
Alnwick	7,000	4,327	$3\frac{1}{4}$
Berwick	10,000	5,619	$2\frac{3}{4}$
Carlisle	26,000	23,000	4
Lancaster	14,000	9,245	—
Morpeth	4,000	2,270	$3\frac{1}{2}$
Ormskirk	5,000	2,982	3
Tynemouth	29,000	12,000	$3\frac{3}{4}$
Walsop	7,000	5,871	$4\frac{1}{2}$

For present prices 35 per cent. should be added.

VENTILATION OF DRAINS.
BY CURRENT DOWN SOIL PIPE.



DRY ROT, CURE OF. (Gwilt.)

Substitute new timbers for the rotten ones, and clear away every particle of the *fungus* known as *Merulius lacrymaus*, both from the adjoining walls and timbers. Afterwards apply some of the washes given for the preservation of timber. Coal tar will effect the same purpose, or a weak solution of vitriolic acid with water will generally stop the rot if it has not gone too far, and pyroligneous acid is recommended for preventing the spread of the rot.

EVAPORATION from water surfaces. (From experiments by Dr. Dalton.)

March	·033 inch per day.
April	·055 " "
May	·075 " "
June	·063 " "
July	·122 " "
Hottest weather ..	·200 " "

EXCAVATORS' MEMORANDA.

NATURAL SLOPES OF EARTHS (WITH HORIZONTAL LINE).

	°		°
Compact earth	50	Dry sand	38
Clay, well drained	45	Vegetable earth	28
Rubble	45	Sand	22
Gravel, average	40	Wet clay	16
Shingle	39		

WEIGHT OF EARTHS, ROCKS, &c., PER CUBIC YARD.

	cwt.		cwt.
Slate	about 43	Chalk	about 36
Trap	" 42	Clay..	" 31
Granite	" 42	Gravel	" 30
Quartz	" 41	Sand..	" 30
Shale	" 40	Marl..	" 26
Sandstone	" 39	Mud..	" 25

In loose ground a man can throw up about 10 cubic yards per day; hard or gravelly soil about 5 cubic yards per day.

Three men will remove 30 cubic yards a distance of 20 yards per day.

20 yards = 1 run.
27 cubic feet = 1 load.
54 " = 1 double load.

		cubic yards.
A dobbin cart will hold about	.. ..	$\frac{3}{4}$
A wheelbarrow ,, ,,	.. ..	$\frac{1}{10}$
An earth waggon ,, ,,	.. ..	$1\frac{1}{2}$
Ditto, large ,, ,,	.. ..	3

1 cubic yard of earth contains about 21 striked bushels.

1 cubic yard of gravel contains about 18 striked bushels.

Proportion of Increase of Earth, &c., when Dug.

	Before digging.		When dug.
Earth and clay	1	..	$1\frac{1}{4}$
Sand and gravel	1	..	$1\frac{1}{10}$
Chalk	1	..	$1\frac{1}{3}$

The following quantities will on an average weigh 1 ton :—

	Cubic feet.		Cubic feet.
Sand, river	21	Marl	28
,, pit	22	Clay	28
Thames ballast ..	22	Night soil	32
Gravel, coarse ..	23	Earth mould ..	33
Shingle, clean ..	24		

FIRE AND INSURANCE, Memoranda of.

1. Brick party walls, besides having no opening therein, must be carried through the slated or tiled roof, otherwise the building will be rated as of the "second class," and be charged the same rate of premium as a *brick and timber* building.

2. Well-holes for light and for staircases, as also for lifts, lined with wood, are considered as increasing the risk from fire.

3. Windows looking into areas common to other buildings also considered to add to the risk.

4. Buildings having a curb or Mansard roof, with rooms in the roof, come under the same denomination as brick and timber buildings, and are rated accordingly.

5. Gratings to public thoroughfares, when they open directly into any room on the basement story, are now regarded as dangerous by all leading Fire Offices, so many fires having recently originated from fusees or pipe-lights dropped through said gratings.

6. The spaces behind register stoves should be filled up solid with brickwork. Many fires are caused by the space behind the stove being left a vacuity, which gets filled with soot from the flue, and, smouldering behind the stove, it ignites plugs or grounds, or other adjacent woodwork.

7. Many fires are caused by want of proper cow-dung pargetting to smoke-flues.

8. Engine, furnace, and bakehouse chimney should be carried up outside the main walls of the building, and be formed with brickwork independently of those walls.

9. Fire-places in carpenters' shops should have brick fenders 2 ft. 6 in. high, with a lifting or sliding iron shutter to completely enclose fire-place when not in use.

10. Pipe stoves on wood floors to stand on a stove or other hearth constructed of incombustible materials, which must be at least 7 inches thick,

measuring from its upper face to the under side which rests on the wood floor.

11. All pipe flues from close stoves to be of *sheet*—not *cast*—iron, and to be fixed 9 inches clear of any woodwork or timbering.

12. All steam or hot-water pipes to be fixed 3 inches clear of any woodwork or timbering.

13. India-rubber tubing to supply gas stoves is liable to melt near its connection with the stove.

14. Metal composition gas-piping is objectionable. Fires have originated from common acts, such as driving a tack into this piping, and many, originally, small accidents from fire have been magnified by the melting of this kind of gas pipe.

15. No extra rate of Fire Insurance is charged if a building is heated by *hot water*, provided the furnace and apparatus be placed in a brick-vaulted chamber. But buildings heated by hot air are considered a greater risk.

16. Contiguity to an inferior structure or to a manufactory brings a first-class insurance within the more hazardous risk if there be either door or window openings overlooking said inferior structure or manufactory.

FIVE ORDERS of ARCHITECTURE.

Height of	Tuscan column	..	7	diameters.
,,	Doric ,,	..	8	,,
,,	Ionic ,,	..	9	,,
,,	Corinthian ,,	..	10	,,
,,	Composite ,,	..	10	,,

Scamozzi says it was the common practice of the ancients to make all the entablatures $\frac{1}{4}$th the height of the column.

ENTABLATURE. (Perrault.)

	Whole height divided into	Giving to		
		Architrate.	Frieze.	Cornice
	parts.			
Tuscan	10	3	3	4
Doric	8	2	3	3
Ionic	10	3	3	4
Corinthian	10	3	3	4
Composite	10	3	3	4

Half the lower diameter of the column is called a *module*, which, being divided into 30 equal parts, are called *minutes*.

Memoranda for proportioning the Five Orders to any given height. (By Palladio, Vignoles, Batty Langley, and others.)

TUSCAN ORDER.

To proportion the Tuscan order with its pedestal to any given height, and to find the diameter of the column,

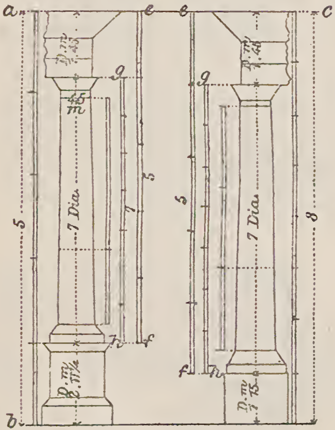
Let *a b*, Fig. 4, be the given height.

Divide *a b* into 5 parts, giving 1 to the pedestal.
„ *e f* „ 5 „ „ 1 „ entablature.
„ *g h* „ 7 „ „ 1 „ diameter of column.

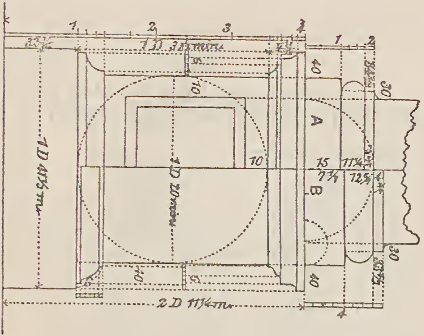
To proportion the Tuscan order with its subplinth to any given height,

Let $c\ d$, Fig. 4, be the given height.

Fig. 4.

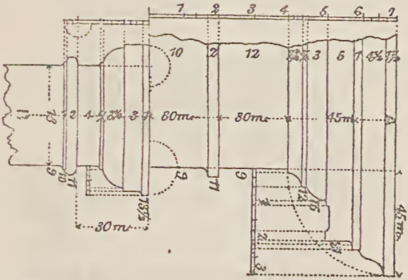


Divide $c\ d$ into 8 parts, giving 1 to the subplinth, and divide $e\ f$ and $g\ h$ as before.



Example of Tuscan Base and Pedestal, proportioned by minutes and equal parts.

Fig. 5.



Example of Tuscan Entablature, proportioned by minutes and equal parts.

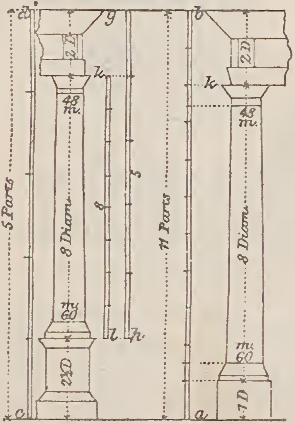
Fig. 6.

Doric Order.

To proportion the Doric order with its pedestal to any given height, and to find the diameter of the column,

Let *c d*, Fig. 7, be the given height.

Fig. 7.

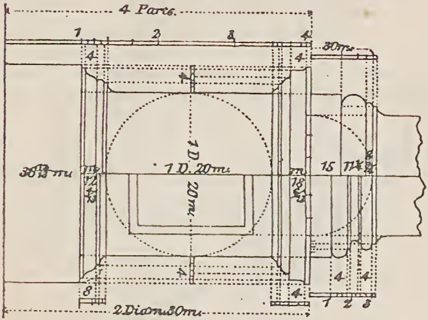


Divide	*c d*	into	5	parts, giving	1	to the pedestal.
"	*g h*	"	5	"	1	" entablature.
"	*k l*	"	8	"	1	" diameter of column.

To proportion the Doric order with its subplinth to any given height, and to find the diameter of the column,

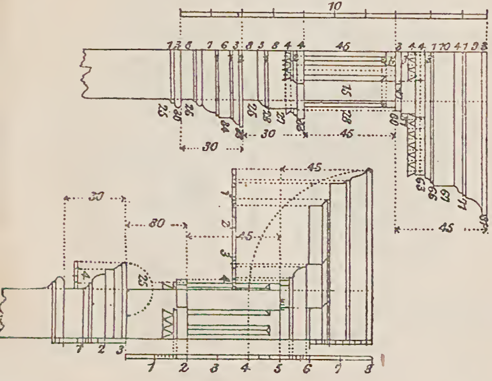
Let *a b*, Fig. 7, be the given height.

Divide *a b* into 11 parts, giving	1 to the subplinth.
	2 " entablature.
	8 " column.



Example of Doric Pedestal and Base, proportioned by minutes and equal parts.

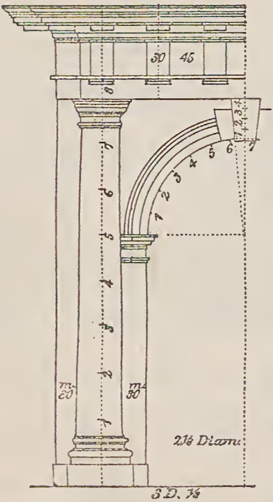
Fig. 8.



Examples of Doric Entablature and Capital, proportioned by minutes and equal parts.

Fig. 9.

Fig. 10.



IONIC ORDER.

To proportion the Ionic order with its pedestal to any given height, and to find the diameter of the column,

Let *c d*, Fig. 11, be the given height.

Divide *c d* into 5 parts, giving 1 to the pedestal.

„ *e f* „ 6 „ „ 1 „ entablature.

„ *g h* „ 9 „ „ 1 „ diameter of column *k l*.

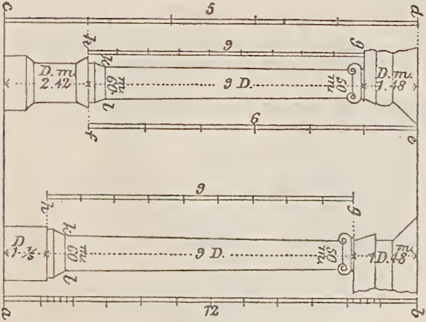
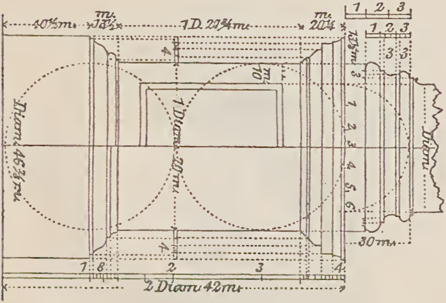


Fig. 11.



Example of Ionic Pedestal and Base, proportioned by minutes and parts.

Fig. 12.

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To proportion the Ionic order with its subplinth to any given height, and to find the diameter of the column,

Let *a b*, Fig. 11, be the given height.

Divide *a b* into 12 parts, giving $\begin{cases} 1\frac{1}{5} \text{ to subplinth.} \\ 1\frac{4}{5} \text{ to entablature.} \end{cases}$

Divide *e f*, &c., as before.

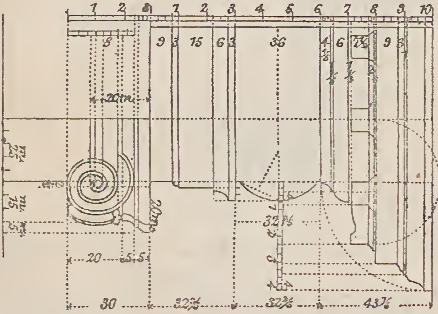


Fig. 13.

Example of Ionic Entablature and Capital, proportioned by minutes and equal parts.

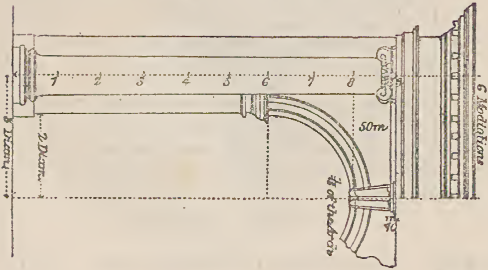


Fig. 14.

Corinthian Order.

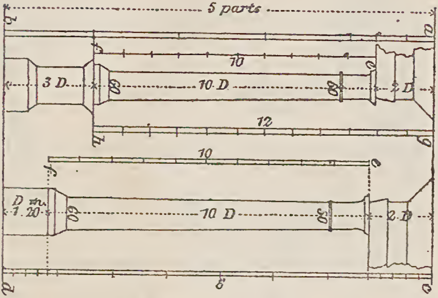
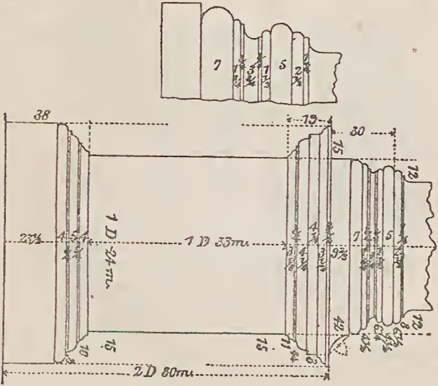


Fig. 15.



Example of Corinthian Pedestal and Base, proportioned by minutes.

Fig. 16.

To proportion the Corinthian order with its pedestal to any given height, and to find the diameter of the column,

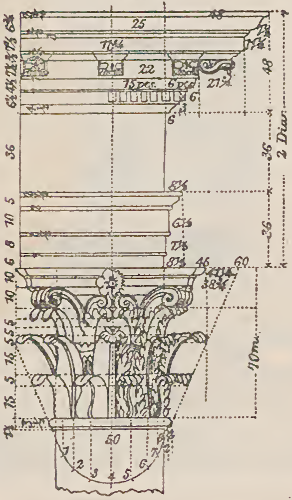
Let $a\ b$, Fig. 15, be the given height.

Divide $a\ b$ into 5 parts, giving 1 to the pedestal.

Divide $g\ h$ into 12 parts, giving
- 10 to the column.
- 2 " entablature.
- 1 " diameter of column.

Example of Corinthian Entablature and Capital, proportioned by minutes.

Fig. 17.



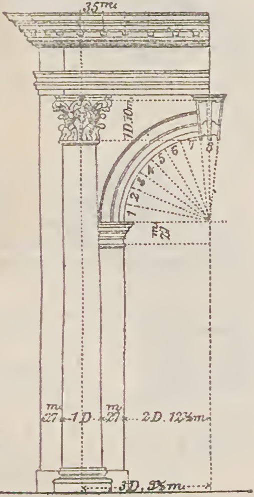
To proportion the Corinthian order with its subplinth to any given height, and to find the diameter of the column,

Let *c d*, Fig. 15, be the given height.

Divide *c d* into 8 parts, giving { $\frac{4}{5}$ths to the subplinth, and $1\frac{1}{5}$th to the entablature.

Divide *g h*, &c., as before.

Fig. 18.



COMPOSITE ORDER.

Proportioned in the same way as the Corinthian.

COMPARISON OF GREEK AND ROMAN ORDERS. (Gwilt.)

	Column. Diameters in height.	Entablature in terms of diameter.	Height of Capital in terms of diameter.	Upper diameter of Shaft.
GREEK.				
DORIC.				
Parthenon	5·56	1·97	0·459	—
Temple of Corinth ..	4·06	—	0·405	—
IONIC.				
Temple of Ilyssus ..	8·24	2·65	0·61	0·85
„ Erectheus	9·33	—	0·77	0·81
CORINTHIAN.				
Choragic monument of Lysicrates ..	10·38	2·16	1·21	0·83
ROMAN.				
DORIC.				
Marcellus (Theatre)	7·86	$\frac{1}{5}$ whole height of order.	—	—
IONIC.				
Coliseum	8·84	2·28	0·46	0·83
Temple of Fortuna Virilis	8·79	2·18	0·45	0·87
CORINTHIAN.				
Pantheon	9·80	2·31	1·17	0·85
Jupiter Tonans ..	10·24	2·06	1·16	0·86

The lower diameter of the column being reckoned 1·000.

FIVE ORDERS OF ARCHITECTURE.

When Intercolumniations are—

$1\frac{1}{2}$ times lower diameter of columns they are called				*pycnostyle*
2	"	"	"	*systyle.*
$3\frac{1}{4}$	"	"	"	*eustyle.*
3	"	"	"	*deccastyle.*
4	"	"	"	*arœostyle.*

When porticos consist of 4 columns with 3 intercolumniations, they are called *tetrastyle;* with 6 columns, *hexastyle;* with 8 columns, *octastyle.*

FLINT WALLS

Should be built slowly and solidly with a stiff strong mortar, compounded of quick-setting lime and coarse sharp sand. Flint walls must be kept dry during their erection as well as subsequently.

FLOORS OF TIMBER. (Tredgold.)

L = Length in feet.
B = Breadth in inches.
D = Depth in inches.

GIRDERS. (Not exceeding 10 feet apart.)

To find the depth :—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 4·2 for fir, or by 4·3 for oak, will give the depth in inches.

To find the breadth :—

Divide the square of the length in feet by the cube of the depth in inches; and the quotient multiplied by 74 for fir, or by 82 for oak, will give the breadth in inches.

Binding Joists. (6 ft. apart.)

$$D = \sqrt[3]{\frac{L^2}{B}} \times 3 \cdot 42 \text{ for fir, or } 3 \cdot 53 \text{ for oak.}$$

$$B = \frac{L^2}{D^3} \times 40 \text{ for fir, or } 44 \text{ for oak.}$$

Or to find the depth:—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 3·42 for fir, or by 3·53 for oak, will give the depth in inches.

To find the breadth:—

Divide the square of the length in feet by the cube of the depth in inches; and multiply the quotient by 40 for fir, or by 44 for oak, will give the breadth in inches.

Single Joists. (12 in. from centre to centre.)

$$D = \sqrt[3]{\frac{L^2}{B}} \times 2 \cdot 2 \text{ for fir, or } 2 \cdot 3 \text{ for oak.}$$

Or to find the depth:—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 2·2 for fir, or by 2·3 for oak, will give the depth in inches.

Ceiling Joists. (12 in. from centre to centre.)

$$D = \frac{L}{\sqrt[3]{B}} \times 0 \cdot 64 \text{ for fir, or } 0 \cdot 67 \text{ for oak,}$$

or $\frac{1}{2}$ in. deep for every foot in length of bearing, and 2 in. broad.

Or to find the depth:—

Divide the length in feet by the cube root of the breadth in inches; and multiply the quotient by 0·64 for fir, or by 0·67 for oak, will give the depth in inches.

Single Joisted Floors.

(With herring-bone strutting; struts 2 in. × 2 in.)

Fig. 19.

Double Floors.

A Floor boards.
B Floor joists.
C C Binders.
D Ceiling joists.
E E Girders.

Fig. 20.

Fig. 21.

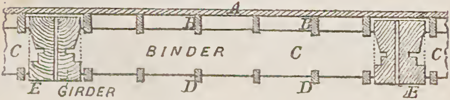


TABLE OF WOOD JOISTS, FLOORING, &c., IN BALTIC FIR. (Tredgold.)

Length of bearing in feet.	GIRDERS. 10 feet apart.		BINDERS. 4 to 6 feet apart.		JOISTS. 1 foot apart.		CEILING JOISTS. 1 foot apart.	
	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.
6	—	—	7	4	6	2	3½	2
8	—	—	8	5½	7	2½	4	2¼
10	10	7½	9	5½	7½	2½	5	2½
12	11	8	10	6	8½	2½	6	2½
14	12	8	10	8	9½	2½	—	—
16	12½	10	11	8	10½	2½	—	—
18	13	11	12	7½	12	2½	—	—
20	14	11	—	—	12	3	—	—
24	16	11	—	—	—	—	—	—
26	16	13	—	—	—	—	—	—

When the bearing of the joists exceeds 8 feet, the joists should be strutted with a row of struts for each 4 feet of bearing extra.

For trimming joists, add $\frac{1}{8}$ of an inch in breadth to the size over that of ordinary joists for each joist supported by the trimmer.

Weight which floors have to carry :—

	per ft. sup.
Workshops and public halls	$1\frac{1}{2}$ cwt.
Heavy goods stores, and factories ..	$2\frac{1}{2}$,,
Ordinary dwelling-houses	$1\frac{3}{8}$,,

Fig. 22.

When a timber is laid over several points of support, as in sketch, the strength of the intermediate parts is about twice as much as when cut into short lengths : hence the advantage of using rafters, bridging joists, purlins, &c., in long lengths.

Safe Loads.

Timber is permanently injured if more than $\frac{1}{4}$ the breaking weight is placed upon it.

FOOTINGS OF WALLS.

The projection of the bottom of the footing of every wall, on each side of the wall, should be at least equal to one-half of the thickness of the wall at its base; and the diminution of the footing

of every wall should be formed in regular offsets, and the height from the bottom of such footing to the base of the wall should be at the least equal to one-half of the thickness of the wall at its base.

GASFITTERS' WORK, Memoranda of.

Wrought-iron welded tubing for gas supply is made from 2 in., $1\frac{1}{2}$ in., $1\frac{1}{4}$ in., 1 in., $\frac{3}{4}$ in., $\frac{1}{2}$ in., $\frac{3}{8}$ in., $\frac{1}{4}$ in., and $\frac{1}{8}$ in. diameter, in lengths from 4 to 12 feet, from 2 feet to 4 feet, and shorter pieces under 2 feet, with connecting pieces, elbows, bends, cocks, taps, screws, &c., to each of the above sizes.

The Metropolitan Fire Brigade say that no gas bracket should be placed nearer to a ceiling than 36 inches, and at that distance should be protected by a hanging shade.

Tin and composition gas piping has been the cause of many fires. Wrought-iron welded tubing should be used.

No gas pipe should be let into the plastering.

Copper pipes should not be used, as after a time a detonating substance is formed in the pipe by the action of the gas on the metal.

Weight of Gas Tubing.

Diameter.	Weight per 100 feet.
$\frac{1}{8}$ inch	28 lbs.
$\frac{1}{4}$ "	41 "
$\frac{3}{8}$ "	$60\frac{1}{2}$ "
$\frac{1}{2}$ "	87 "
$\frac{3}{4}$ "	117 "
1 "	179 "
$1\frac{1}{4}$ "	252 "
$1\frac{1}{2}$ "	297 "
2 "	448 "

GAS.

For private Gas Works, bones, oil, grease, peat, and wood are used for distilling gas, but where coal does not exceed 80*s.* per ton, it is cheapest.

INTERCEPTION OF LIGHT BY GAS AND OTHER GLASSES.

Common window glass	intercepts	light	8 to 10	per cent.
Ground glass	,,	,,	26 ,, 31	,,
Clean glass globe	,,	,,	10 ,, 12	,,
Common figured globe	,,	,,	23 ,, 25	,,
Ground globe	,,	,,	28 ,, 33	,,
Opal shade	,,	,,	54 ,, 58	,,
Ditto, painted	,,	,,	63	,,

RELATIVE PRICES OF ARTIFICIAL LIGHT.
(Assuming Gas to be 5*s.* per 1000.)

	s.	*d.*	
Gas	0	7½	For equal quantities of light.
Sperm Candles ..	13	0	
Wax	11	9	
Dips (tallow) ..	3	6	

Light decreases in the ratio of the square of its distance from its source.

GAS SUPPLY.

Internal lights require about 4 cubic feet of gas per hour.
External ,, ,, 5 ,, ,, ,,
Argand burners from 6 to 10 ,, ,, ,,
Lamps consume about 21,000 cubic feet per year.
Private burners ,, 5,000 ,, ,,

SUPPLY OF GAS THROUGH PIPES.

$$Q = 1000 \sqrt{\frac{D^5 H}{S L}}.$$

Q = Quantity of gas in cubic feet per hour.
D = Diameter of pipe in inches.
H = Head of water pressure in inches.
S = Specific gravity of gas.
L = Length of pipe in yards.
H may be taken = 1 inch to ½ inch.
G ,, ,, = 45 ,,

TABLES OF THE SUPPLY OF GAS THROUGH PIPES IN CUBIC FEET PER HOUR. (Length of Pipe = 10 yards.)

Diameter of Pipe in inches.	Supply of Gas in cubic feet per hour. (Approximately.)							
	Pressure by the Water-Gauge in inches.							
	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{3}{10}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2
$\frac{3}{8}$	10	15	20	25	35	40	—	—
$\frac{1}{2}$	20	30	40	50	70	80	—	—
$\frac{3}{4}$	60	85	105	135	190	210	—	—
1	120	180	240	300	380	430	—	—
$1\frac{1}{4}$	230	300	370	540	680	800	—	—
$1\frac{1}{2}$	350	500	650	800	1000	1200	—	—
2	700	1000	1300	1600	2000	2500	—	—
Length of Pipe = 100 yards.								
$\frac{3}{4}$	20	30	40	50	60	70	85	100
1	47	60	80	100	120	140	175	200
$1\frac{1}{2}$	120	175	210	275	330	400	500	575
2	—	—	—	580	725	830	1025	1175
$2\frac{1}{2}$	—	—	—	1020	1260	1450	1780	2050
3	—	—	—	1620	1980	2300	2820	3250

GIRDERS.

STRENGTH OF WOOD GIRDERS OR BEAMS.

Rule to find the breaking weight in the middle for girders of wood supported at both ends:—

Multiply the breadth in inches by the square of the depth in inches, and divide by the length of bearing in feet, and multiply the result by 3 for Riga fir, or by 4 for red pine, or by 5 for English oak = to breaking weight in middle in cwts.

Example.—To find the breaking weight in the middle of a beam of Riga fir 6 inches broad, 10 inches deep, and 10 feet bearing :—

$$\frac{6 \times 10^2}{10} = \frac{600}{10} = 60 \times 3 = 180, \text{ the B. W. } m \text{ in cwts.}$$

For a permanently *distributed* load the breaking weight will be double the breaking weight in the middle.

According to Tredgold the safe load should not exceed $\frac{1}{5}$th the breaking weight.

Thus, taking 180 cwt. for the breaking weight in the middle, the safe load permanently distributed will be

$$\frac{180 \times 2}{5} = \frac{360}{5} = 72 \text{ cwt.}$$

The usual formula is

$$w = s \frac{b\, d^2}{l}.$$

w = Breaking weight in the middle in cwts.
b = Breadth in inches.
d = Depth in inches.
l = Length in feet.

Value of s according to Barlow.

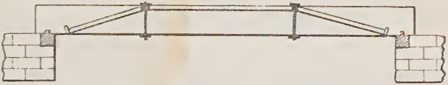
$s = 6$	for	English ash.
$= 5$	,,	,, oak.
$= 4\frac{1}{3}$	,,	Dantzic oak.
$= 5$	,,	Pitch pine.
$= 4$	,,	Red pine.
$= 3$	,,	Riga fir.

When girders exceed 22 feet in length, it is usual and necessary to strengthen them. This is done in two ways, viz. by trussing and flitches. Little gain is effected in strength by trussing, as will be seen by the following experiments by Barlow; and the value of flitches will be seen from the following table of experiments made at the Royal Arsenal, Woolwich. See page 77.

The usual method of trussing a girder is shown in Figs. 23 and 24.

Fig. 23.

Fig. 24.



TRUSSED GIRDERS. (Barlow.)

Description.	Length of Bearing.		Weight.	Deflection.
	ft.	in.	lbs.	ins.
Two oak trusses meeting against king bolt in centre, with plate bolts at abutments, scantling 2 in. deep × $1\frac{7}{8}$ in. broad ..	4	2	600	0·87
Similar, without trusses ..	4	2	600	1·00
Three trusses with 2 queen bolts, and plate bolts at abutments	5	8	500	2·25
Similar, without trusses ..	5	8	500	1·55

Girders of Wood, with Wrought-iron Flitches.

To find the breaking weight in cwts. in the middle.

Rule.—For oak add 4 times ⎫ the breadth* of the
,, fir ,, 3 ,, ⎭ girder in inches to
30 times the thickness of the wrought-iron flitch in inches, and multiply the result by the square of the depth in inches, and divide by the length of bearing in feet, will give the breaking weight in cwts. in the middle. (The proportion for thickness of flitch given below should be observed.)

Formula for oak :

$$\text{B. W. } m = \frac{\text{D}^2}{\text{L}} (4\,\text{B} + 30\,t).$$

For fir :

$$\text{B. W. } m = \frac{\text{D}^2}{\text{L}} (3\,\text{B} + 30\,t).$$

*B = Breadth of wood in inches.
D = Depth ,, ,,
L = Length of bearing in feet.
t = Thickness of wrought-iron flitch in inches.

B. W. m = Breaking weight in cwts. in middle.

For an equally distributed load, take twice the B. W. m.

Safe load, $\frac{1}{5}$th.

Thickness of wrought-iron flitch should be from $\frac{1}{10}$th to $\frac{1}{12}$th the thickness of the wood.

* In taking the breadth, the thickness of the flitch should be included.

Examples of Experiments made at Royal Arsenal, Woolwich.

Description of Girder. 18 feet long—Supports 17 feet apart.	Load.	Deflection. At Middle.	Deflection. At 4 ft. 3 in. from middle.	
	lbs.	inches.	inches.	
Two Memel deals 9 × 3, laid side by side, and load distributed	6,534	1·3	1·1	Broke in middle with 13,102 lbs.
Ditto, loaded in middle	6,166	3·5	2·7	Ditto, 6,800 lbs.
Two 9 × 3 deals as above, bolted together with 12 ¾ wrought-iron bolts—load distributed	6,466	1·6	1·2	Ditto, 13,503 lbs.
Two 9 × 3 deals as above, with 9 × ½ wrought-iron plate in middle, bolted with 11 ¾-in. bolts—load distributed ..	9,293	1·0	0·7	Ditto, 34,862 lbs.
Ditto, ditto	16,617	1·7	1·3	
Ditto, load in middle	7,148	1·0	0·7	
Ditto, ditto	16,491	3·5	2·5	Ditto, 18,079 lbs.
Ditto, with wrought-iron flitch only 9 ft. 3 in. long—load distributed	9,568	1·5	1·2	Broke with 21,566 lbs.
Ditto, ditto	14,699	2·2	2·0	
Ditto, load in middle	9,012	2·0	1·5	Ditto, 14,873 lbs.
Ditto, ditto	14,873	broke		
Rectangular beam of 12 × 9 Baltic fir—load distributed	5,503	0·5	0·3	Broke with 27,076 lbs. in 2 places near middle.
Ditto, ditto	9,147	1·0	0·7	
Ditto, ditto	19,690	2·0	1·5	
Ditto, scantling, 9 × 6	5,836	1·5	1·2	Ditto, 11,879 lbs.
Ditto, ditto	8,645	2·6	2·0	

GIRDERS OF CAST IRON.

To find the breaking weight in the middle in tons.

Rule.—Multiply the area of bottom flange in inches by *twice* the depth in inches, and divide by the length of bearing in feet. The result will give the breaking weight in tons in the middle.

$$\frac{A \times 2D}{L} = \text{B. W. } m \text{ in tons.}$$

A = Area of bottom flange in inches.
D = Depth of girder in inches.
L = Length of bearing in feet.
B. W. m = Breaking weight in tons in the middle.

Another rule (Hodgkinson):

$$\frac{\text{A in inches} \times \text{D in inches} \times 26}{l \text{ in inches}} = \text{B. W. } m \text{ in tons.}$$

If the load is distributed over the length of the girder, it will be = twice B. W. m.
Safe load, $\frac{1}{5}$th.

Cast-iron Girders.

Table of Breaking Weight and Deflection.

Size of Girder.						
Total Depth.	Bottom Flange.	Top Flange.	Thickness of web.	Length of Bearing.	Breaking Weight in tons.	Permanent Deflection when Tested.
ins.	ins. ins.	in. in.	feet.	ft.		
18	12 × 1½	5½×1¼	1¼	15	45	Tested with 20 tons in centre, deflection 0·09 in.
16	13½× 1⅝	8×1½	1⅛	28	54·3	Tested with 30 tons in centre, deflection 0·68 in.
24	18 × 2	10×1¼	1½	30	60	Tested with 30 tons in centre, deflection 0·51 in.
24	18 × 2	7×1¾	1½	30	60	Tested with 30 tons in centre, deflection 0·90 in.

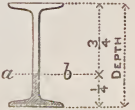
Girders of Wrought Iron.

To find the breaking weight in tons in the middle, both ends of girder supported,

For rolled girders, multiply 7 times }
" box " " 6½ " } the depth
" I " " 6 " }
" T " " 4 " }

of girder by the area of bottom flange (including the angle irons), and divide by length of bearing in feet. The result will give the B. W. m in tons.

The area of the bottom flange includes the web to ¼th the depth of girder, or the part below a b.



Example of a plate girder for a span of 30 feet. (Fairbairn.)

Girder, 31 ft. 6 in. long.

Plates, 22 in. deep × $\frac{5}{16}$th in. thick

Angle iron, 3 in. × 3 in. × $\frac{1}{2}$ in. at the bottom.
" 4 in. × 4 in. × $\frac{1}{2}$ in. at the top.

The B. W. *m*, taking the constant at 75, is

$$\frac{\text{A in inches} \times \text{D in inches} \times \text{C}}{\text{L in inches}} = \text{B. W. } m,$$

or

$$\frac{6 \times 22 \times 75}{360} = 27 \cdot 5 \text{ tons},$$

the B. W. *m*, or 55 tons, distributed equally over the length.

Safe load for wrought-iron girder, $\frac{1}{4}$th.

Wrought-iron Girders. (Stephenson's Rule.)

A = Area of bottom flange in inches.
D = Depth of girder in inches.
S = Span in inches.
W = Breaking weight in tons.

For girders supported at both ends and loaded in centre,

$$W = \frac{80 \text{ A D}}{S}.$$

For girders supported at both ends, load distributed,

$$W = \frac{160 \text{ A D}}{S}.$$

Area of top flange = $1\frac{1}{6}$ A.

Depth = $\frac{S}{12}$ to $\frac{S}{13}$.

In compression, iron may be strained to 4 tons per square inch.

In tension, iron may be strained to 5 tons per square inch.

Patent Rolled Iron Joists and Girders.

Table of Safe Load in Tons Distributed.

Section.		Total Depth in ins.	Width of Flanges in ins.	Top Plate in ins.	Weight per foot in lbs.	Width of Bearings.					
						7 Feet.	10 Feet.	13 Feet.	16 Feet.	20 Feet.	25 Feet.
A*	R I joist	4	—	—	6	2·1	1·4	1·1	·847	·641	—
	„	5½	$2\frac{1}{8}$	—	9	3·2	2·1	1·6	1·2	·900	—
	„	7	$3\frac{5}{8}$	—	13	7·1	4·7	3·5	2·8	2·1	—
	„	9¼	—	—	24	13·2	8·8	6·6	5·2	4·4	3·4
B*	Girder . .	7½	$2\frac{3}{8}$	4×½	20	14·3	9·5	7·1	5·7	4·3	3
	„ . .	9¼	2¾	6×½	29	20	13	9·7	7·7	6·3	4
	„ . .	10½	4¾	6×½	44	41	27	20	16	13	9½
C*	Girder . .	9¾	4½	9×½	70	—	36	27	20	14	11
	„ . .	10½	4¾	12×½	95	—	56	41	30	22	17
D*	Girder . .	20½	4¾	12×½	160	—	—	68	66	50	{ Span 26 ft. = 38 tons „ 30 „ = 30 „

* See Sections A, B C, and D, on following page.

Fig. 25.

Fig. 26.

Fig. 27.

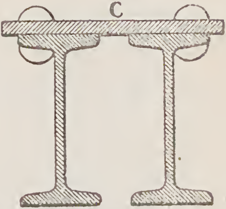
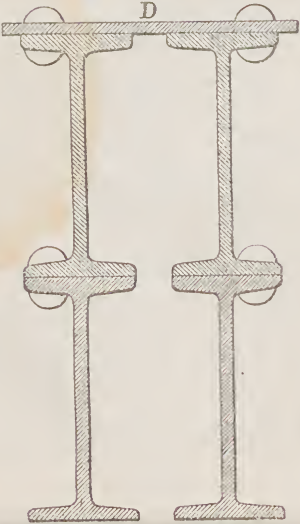


Fig. 28.



A TABLE showing the estimated safe permanent distributed LOADS, in Tons, for various Rolled Wrought-Iron Girders and Joists.

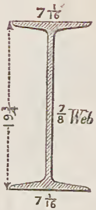
Sectional Dimensions.	Weight per foot.	Position of Load.	6 feet.	8 feet.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.	26 ft.	28 ft.	30 ft.
" " "															
12 × 5 × 5 ..	44	Centre	$21\frac{9}{20}$	$16\frac{2}{20}$	$12\frac{16}{20}$	$10\frac{17}{20}$	$9\frac{5}{20}$	$8\frac{3}{20}$	$7\frac{4}{20}$	$6\frac{10}{20}$	6	$5\frac{10}{20}$	—	—	—
12 × 5 × 5 ..	,,	Uniformly distributed.	36	27	$21\frac{12}{20}$	18	$15\frac{8}{20}$	$13\frac{10}{20}$	12	$10\frac{16}{20}$	$9\frac{16}{20}$	9	$8\frac{5}{20}$	$7\frac{5}{20}$	$6\frac{10}{20}$
10 × 5 × 5 ..	36		$27\frac{10}{20}$	$20\frac{12}{20}$	$19\frac{10}{20}$	$13\frac{10}{20}$	12	$10\frac{5}{20}$	$9\frac{2}{20}$	8	$7\frac{2}{20}$	$6\frac{10}{20}$	$5\frac{12}{20}$	5	$4\frac{8}{20}$
8 × 5 × 5 ..	32		$18\frac{10}{20}$	$13\frac{15}{20}$	11	$9\frac{2}{20}$	$7\frac{16}{20}$	$6\frac{15}{20}$	6	$5\frac{8}{20}$	5	$4\frac{12}{20}$	$4\frac{5}{20}$	$3\frac{18}{20}$	$3\frac{12}{20}$
8 × $4\frac{1}{2}$ × $4\frac{1}{2}$ ..	30		$16\frac{10}{20}$	$12\frac{8}{20}$	10	$8\frac{15}{20}$	$7\frac{2}{20}$	6	$5\frac{10}{20}$	$4\frac{18}{20}$	$4\frac{10}{20}$	$4\frac{2}{20}$	$3\frac{17}{20}$	$3\frac{12}{20}$	$3\frac{8}{20}$
7 × 4 × 4 ..	24		13	$9\frac{15}{20}$	$7\frac{16}{20}$	$6\frac{10}{20}$	$5\frac{12}{20}$	$4\frac{12}{20}$	$4\frac{7}{20}$	$3\frac{18}{20}$	$3\frac{11}{20}$	$3\frac{5}{20}$	$2\frac{15}{20}$	$2\frac{7}{20}$	$1\frac{15}{20}$
$6\frac{1}{4}$ × $3\frac{1}{4}$ × $3\frac{1}{4}$ ..	18		$8\frac{15}{20}$	$6\frac{12}{20}$	$5\frac{14}{20}$	$4\frac{10}{20}$	$3\frac{18}{20}$	$3\frac{8}{20}$	$2\frac{16}{20}$	$2\frac{11}{20}$	$2\frac{6}{20}$	2	$1\frac{15}{20}$	$1\frac{12}{20}$	$1\frac{7}{20}$
$4\frac{5}{8}$ × $3\frac{1}{4}$ × 3 ..	14		$4\frac{9}{20}$	$3\frac{6}{20}$	$2\frac{13}{20}$	$2\frac{4}{20}$	$1\frac{18}{20}$	$1\frac{14}{20}$	$1\frac{10}{20}$	$1\frac{7}{20}$	$1\frac{4}{20}$	$1\frac{2}{20}$	$\frac{18}{20}$	$\frac{17}{20}$	$\frac{16}{20}$
8 × $2\frac{5}{8}$ × $2\frac{5}{8}$ ..	20		11	$8\frac{5}{20}$	$6\frac{16}{20}$	$5\frac{10}{20}$	$4\frac{15}{20}$	$4\frac{5}{20}$	$3\frac{15}{20}$	$3\frac{4}{20}$	3	$2\frac{15}{20}$	2	$1\frac{17}{20}$	$1\frac{15}{20}$
7 × $2\frac{1}{8}$ × $2\frac{1}{8}$ ..	18		$9\frac{2}{20}$	$6\frac{15}{20}$	$5\frac{18}{20}$	$4\frac{14}{20}$	$4\frac{2}{20}$	$3\frac{12}{20}$	3	$2\frac{16}{20}$	$2\frac{10}{20}$	$2\frac{4}{20}$	$1\frac{17}{20}$	$8\frac{14}{20}$	$1\frac{10}{20}$
$6\frac{1}{4}$ × 2 × 2 ..	13		$5\frac{6}{20}$	$4\frac{2}{20}$	$3\frac{5}{20}$	$2\frac{15}{20}$	$2\frac{7}{20}$	$2\frac{1}{20}$	$1\frac{16}{20}$	$1\frac{13}{20}$	$1\frac{10}{20}$	$1\frac{7}{20}$	$1\frac{4}{20}$	$1\frac{2}{20}$	1
5 × 2 × 2 .	10		$3\frac{7}{20}$	$2\frac{10}{20}$	2	$1\frac{15}{20}$	$1\frac{9}{20}$	$1\frac{5}{20}$	$1\frac{2}{20}$	1	$\frac{18}{20}$	$\frac{17}{20}$	$\frac{16}{20}$	$\frac{15}{20}$	$\frac{14}{20}$
4 × $1\frac{3}{4}$ × $1\frac{3}{4}$ ..	8		$2\frac{5}{20}$	$1\frac{14}{20}$	$1\frac{7}{20}$	$1\frac{2}{20}$	$\frac{19}{20}$	$\frac{17}{20}$	$\frac{15}{20}$	$\frac{13}{20}$	$\frac{12}{20}$	$\frac{11}{20}$	$\frac{10}{20}$	$\frac{9}{20}$	$\frac{8}{20}$
Temporary Deflection			$\frac{3}{16}$"	$\frac{1}{4}$"	$\frac{5}{16}$"	$\frac{3}{8}$	$\frac{7}{16}$"	$\frac{1}{2}$"	$\frac{9}{16}$"	$\frac{5}{8}$"	$\frac{11}{16}$"	$\frac{3}{4}$"	$\frac{13}{16}$"	$\frac{7}{8}$"	$\frac{15}{16}$"

The above loads, being within the limit of elasticity of the girders, do not give a permanent set, but any material increase of the load would do so. If it is desired to keep the girders perfectly straight, or if they are to be subject to sudden shocks, the loads should be less than are here indicated.

TABLE of the SAFE LOAD, one-fifth of breaking weight, uniformly distributed over its length, between supporters at the following distance :—

Length of Girder.	Safe Load. $\frac{1}{5}$th of breaking weight.	Deflection in Centre.
20 feet.	53,620 lbs.	$\frac{3}{16}$ inch.
23 „	45,960 „	$\frac{4}{16}$ „
26 „	40,218 „	$\frac{5}{16}$ „
30 „	35,745 „	$\frac{6}{16}$ „
33 „	32,170 „	$\frac{1}{2}$ „
36 „	29,250 „	$\frac{9}{16}$ „
40 „	26,810 „	$\frac{11}{16}$ „

Fig. 29.



101½ lbs. per foot.

HEAT.

CONDUCTING POWER OF VARIOUS MATERIALS, SLATE BEING 1000.

Slate	1000	Fire-brick	620
Lead	5210	Asphalte	451
Flagstone	1110	Oak	336
Portland stone	750	Lath and plaster	255
Brick (average)	660	Cement	200

COST OF HEATING BY HOT WATER. (Approximately.)

Houses	about 4*l.*	per 1000 cubic feet.
Churches	from 10*s.* to 25*s.*	„ „
Factories	about 2*l.*	„ „

LINEAR EXPANSION BY HEAT. (From 32° to 212°.)

Deal	1 part in 2450
Brick, Fire	„ 2365
„ Common	„ 1818
Glass, Flint	„ 1177
Slate	„ 964
Iron, Cast	„ 901
„ Wrought	„ 846
Cement, Roman	„ 697
Brass	„ 584
Copper	„ 581
Tin	„ 403
Lead	„ 349
Zinc	„ 322
Steel	„ 877

32° Fahr. = freezing point.
212° „ = boiling „

Expansion of water on freezing = $\frac{1}{12}$th part of its bulk.

HEMP ROPES.

TO FIND THE BREAKING WEIGHT.

Square of the circumference × 0·2 = B. W. in tons.

SAFE WORKING LOAD OF GOOD HEMP ROPES.
(Molesworth.)

Circum. of Rope.	Safe Working Load.			Circum. of Rope.	Safe Working Load.		
inches.	tons.	cwts.	qrs.	inches.	tons.	cwts.	qrs.
1	0	1	3	5¼	2	9	1
1¼	0	2	3	5½	2	14	0
1½	0	4	0	5¾	2	19	0
2	0	7	0	6	3	4	0
2¼	0	9	0	6¼	3	9	3
2½	0	11	0	6½	3	15	2
2¾	0	13	2	6¾	4	4	1
3	0	16	0	7	4	7	2
3¼	0	18	3	7¼	4	13	3
3½	1	1	0	7½	5	0	1
3¾	1	5	0	7¾	5	7	1
4	1	8	2	8	5	14	1
4¼	1	12	1	8¼	6	0	0
4½	1	16	0	8½	6	7	0
4¾	2	0	1	8¾	6	15	0
5	2	4	2	9	7	3	0

HOOP IRON.

MEMORANDA.

B. W. Gauge.	Width in ins.	Weight per foot run.	Weight per 100 lineal feet.	B. W. Gauge.	Width in ins.	Weight per foot run.	Weight per 100 lineal feet.
		lbs.	lbs.			lbs.	lbs.
12	2½	·91	91·78	16	1¼	·27	26·52
13	2¼	·71	71·23	17	1⅛	·21	20·84
13	2	·63	63·31	18	1	·16	16·16
14	1¾	·48	47·15	19	⅞	·12	12·37
15	1½	·36	36·37	20	¾	·087	8·84
15	1⅜	·33	33·34				

ICE, STRENGTH OF.

Ice 2 inches thick will afford a passage for men in single file on a row of planks, the rows being 9 feet apart. [ICE

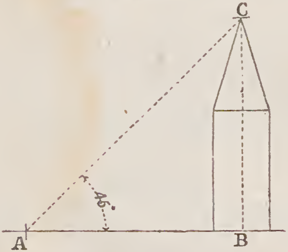
Ice 4 inches thick will bear the passage of cavalry carts at a moderate interval between each cart.

Ice 6 inches thick will afford a passage to waggons drawn by horses, with a moderate interval between each.

INACCESSIBLE HEIGHTS.

A Simple Method of Finding the Height of Towers and Spires.

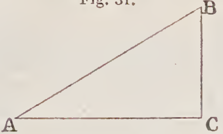
Fig. 30.



To find the height of B C, find a point A where an angle of 45° to the horizontal line (or perpendicular) will strike the height C; then the length A B will be equal to the height B C, because A C will be the diagonal of a square of which A B, B C are equal sides.

Measurement of Heights.

Fig. 31.

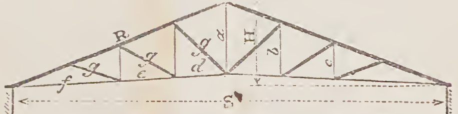


$$C B = \text{tangent } C A B \times A C.$$

IRON ROOFS.

Examples of Iron Roofs. (From actual Practice.)
(Molesworth.)

Fig. 32.

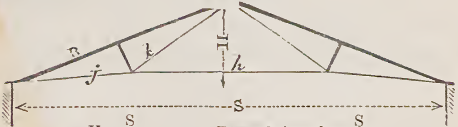


Rise $H = \frac{S}{5}$. Rise of tie-rod $= \frac{S}{40}$.

Principals 6 feet 8 inches apart.

Span.	Rafter R.	Struts.	King and Queen bolts.			Tie-rod.		
8 feet.	T-iron.	T-iron.	*a.*	*b.*	*c.*	*d.*	*e.*	*f.*
20	$2\frac{1}{2} \times 2 \times \frac{3}{8}$	$2 \times 2 \times \frac{3}{8}$	$\frac{3}{4}$	$\frac{5}{8}$		$\frac{5}{8}$	$\frac{3}{4}$	
25	$2\frac{3}{4} \times 2\frac{1}{2} \times \frac{3}{8}$	$2 \times 2 \times \frac{3}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	1	
30	$2\frac{3}{4} \times 2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{8}$	1	$\frac{3}{4}$	$\frac{5}{8}$	1	$1\frac{1}{8}$	
35	$3 \times 2\frac{3}{4} \times \frac{1}{2}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{8}$	1	$\frac{3}{4}$	$\frac{3}{4}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
40	$3\frac{1}{2} \times 3 \times \frac{1}{2}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{8}$	$1\frac{1}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
45	$4 \times 3\frac{1}{2} \times \frac{1}{2}$	$3 \times 3 \times \frac{1}{2}$	$1\frac{1}{4}$	1	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
50	$4 \times 3\frac{1}{2} \times \frac{5}{8}$	$3 \times 3 \times \frac{5}{8}$	$1\frac{3}{4}$	1	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
55	$5 \times 4\frac{1}{2} \times \frac{5}{8}$	$4 \times 4 \times \frac{1}{2}$	$1\frac{3}{8}$	$1\frac{1}{8}$	1	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$
60	$5 \times 4\frac{1}{2} \times \frac{3}{4}$	$4 \times 4 \times \frac{5}{8}$	$1\frac{3}{8}$	$1\frac{1}{8}$	1	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$

Fig. 33.



$H = \frac{S}{5}$. Rise of tie-rod $= \frac{S}{30}$.

Span.	Rafter T-iron.	h.	j.	k.
feet.				
20	$2\frac{1}{2} \times 2 \times \frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{8}$
25	$2\frac{3}{4} \times 2 \times \frac{3}{8}$	$\frac{3}{4}$	1	$\frac{3}{4}$
30	$2\frac{3}{4} \times 2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{4} \times \frac{1}{4}$	$2\frac{1}{4} \times \frac{3}{8}$	$2\frac{1}{4} \times \frac{1}{4}$
35	$3 \times 2\frac{3}{4} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{5}{16}$	$2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{5}{16}$
40	$3\frac{1}{2} \times 3 \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{3}{8}$	$2\frac{1}{2} \times \frac{5}{8}$	$2\frac{1}{2} \times \frac{3}{8}$
45	$4 \times 3\frac{1}{2} \times \frac{1}{2}$	$3 \times \frac{3}{8}$	$3 \times \frac{1}{2}$	$3 \times \frac{3}{8}$

Thick lines in compression, fine lines in tension.

Tests of Iron.

A soft, tough iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

A medium even grain with fibres denotes good iron.

Badly-refined iron gives a short blackish fibre on fracture. A very fine grain denotes hard steely iron, likely to be cold-short, and hard.

Coarse grain with bright crystallized fracture or discoloured spots denotes cold-short, brittle iron, which works easily when heated and welds well. Cracks on the edge of a bar are indications

of hot-short iron. Good iron is readily heated, is soft under the hammer, and throws out few sparks.

JOISTS. See FLOORS, p. 66.

KENTISH RAGSTONE

In its resistance to pressure stands next to granite; but for transverse strain the numerous vents render it untrustworthy. It should not be used for lintels or in suspended positions. Headers are generally knocked out to 6-in., 7-in., 8-in., and 9-in. gauge for the height.

For price, see Mason in Price-book.

LEAD.

To Detect Lead in Water.

In a wineglassful of water put one drop of sulphide of ammonium, and stir it with a glass rod or a goose quill. If there be lead in the water, it will immediately discolour (black).

LEAD PIPES. See p. 122.

LIGHT.

To find the superficial area of light (or window) required to illuminate a room. (Gwilt.)

Superficial area of window = the square root of the cubical space of the room.

This rule is not universal in its application.

LIGHTNING-CONDUCTORS.

ORDINARY SIZES USED.

Upper rod, $\frac{3}{4}$ in. diameter.
„ pipe, $1\frac{1}{8}$ in. diameter and $\frac{1}{8}$ in. thick.

Lightning-conductors should be made to communicate with all metallic surfaces (such as gutters and pipes), and should be let into moist ground at the base.

LIMESTONES.

FROM EXPERIMENTS. (Haswell.)

The purest limestones burn to a white lime, and produce the richest limes.

Rich limes are dissolved fully in water, and remain a long time without hardening: they increase in volume from 2 to $3\frac{1}{2}$ times their original bulk, and will not harden without the action of the air. They are rendered hydraulic by the admixture of pozzolana or trass.

Rich, fat, or common limes usually contain less than 10 per cent. of impurities.

Hydraulic limestones are those which contain iron and clay, so as to enable them to produce cements which become solid when under water.

The pastes of *fat limes* shrink in hardening to such a degree that they cannot be used as mortar without a large dose of sand.

Poor limes have all the defects of rich limes, and increase but slightly in bulk.

Lime absorbs in slacking about $2\frac{1}{2}$ times its volume and $2\frac{1}{4}$ times its weight in water.

Patent selenitic lime for plastering costs about 25*s*. per ton at the works, sets quickly, and will take 6 parts of sand on brickwork and 4 parts on lath; is of a good buff colour, and is readily worked to a smooth face; is also used in Government works for filling in the hollow parts of terra-cotta.

LINTELS OVER OPENINGS.

Depth = $1\frac{1}{4}$ inch for every foot in length of bearing.

Breadth = thickness of walls to be carried by the lintel.

LOADS ON ROOFS.

Exclusive of Framing.

	Per square of 100 sup. ft.	
Lead covering	7	cwt.
Zinc	$1\frac{1}{2}$	,,
Corrugated iron	3	,,
Tiles	9 to 15	,,
Slates	8 ,, 9	,,
Boarding $\frac{3}{4}$ in. thick	$2\frac{1}{2}$	,,
Timber framing for slate or tile roof	5 to 6	,,
Additional load for pressure of wind	36	,,

Mensuration of Surfaces.

Area of triangle ∴ = Base × $\frac{1}{2}$ perpendicular.
" circle .. .. = Diameter^2 × ·7854.
" sector of circle = Length of arc × $\frac{1}{2}$ radius.
" " " =

$$\frac{\text{Number of degrees in arc} \times \text{area of the circle}}{360}$$

Area of parabola .. = Base × $\frac{2}{3}$ height.

Frustum of a parabola = $\frac{2}{3}$ height $\frac{\text{base}^3 - \text{top}^3}{\text{base}^2 - \text{top}^2}$.

Area of ellipse .. .. = Transverse axis × ·7854 conjugate axis.

" cycloid .. .. = Area of generating circle × 3.

Surface of cylinder .. = Area of both ends + length × circumference.

" cone .. .. = Area of base + circumference or base × $\frac{1}{2}$ slant height.

" sphere .. = Diameter^2 × 3·1415 = diameter × circumference.

" frustum .. = Sum of girt at both ends × $\frac{1}{2}$ slant height + area of both ends.

MEASUREMENT OF BUILDERS' WORK.

Excavator.

Digging is measured by the yard cube of 27 feet. Extra depths, methods of removing, whether by basket, barrow, or cart,—if by barrow, and the distance is over 20 yards (called one run),—should be accurately described; also, the final disposal of the materials should be given, whether carted away, filled into trenches and rammed, filled in, levelled, and rammed to receive tile or other pavings, or disposed of in terraces.

Wells.

Cesspools and rain-water tanks are taken by themselves, a careful description of the sizes being given, also methods of lining, steining, and doming over. Well-digging is a separate calling, and it is generally made a condition with the well-digger that a certain quantity of water shall be obtained either by boring or digging, the contract not being complete unless the quantity of water described is obtained.

Drains are measured by the foot run, the size and quality of the pipes and method of jointing being accurately described; the average depth of the trenches must be given, the cost of digging, filling in, and ramming the earth after the drains are formed, and the carting away or other method of disposing of the superfluous earth, is charged for with the pipes, &c. All bends, junctions, traps, connections with cesspools, feet of rain-water or other pipes, all small cesspools, &c., are numbered, and the price charged always includes for the necessary digging, filling in, and disposal of the superfluous earth. Barrel drains formed of brick are measured at per foot run, as described for pipes. Brick sewers are measured by the rod superficial of 272 feet, 1½ brick thick, the work being accurately described; all labours, centres, &c., being measured as described in Bricklayer.

Concrete.

Concrete, in foundations or otherwise, above 12 inches thick, is measured by the cubic yard.

Concrete under pavings, &c., or when less than 12 inches thick, is taken by the superficial yard, stating thickness.

Concrete filling-in over arches should be classed separate.

Bricklayer.

All brick walls, &c., are measured and reduced to the "rod," containing 272 feet superficial, of $1\frac{1}{2}$ brick thick. Circular work is classed separate. All openings are deducted. Ordinary flues are not deducted, but fire-place openings are.

The following items are taken at per foot superficial;—cuttings over 6 inches wide; facings and joint; arches, axed or gauged; centering; trimmer arches; half-brick walls, in mortar or cement; damp course.

Vault arches, at per rod (reduced), stating thickness.

Groin, point, and cutting, at per foot run.

Cutting to skewbacks, &c.

Rake out any point to soffits, at per yard superficial.

At per Foot Run.

Birds' mouths, fair or rough; squints, fair or rough; forming channels for pipes; all splayed or moulded bricks in plinths; sills, strings, jambs, &c., in mortar or cement; brick on edge, or other coping in mortar or cement; cuttings to pavings, &c. Hoop-iron bond is generally measured by the foot run, the price including setting; sometimes it is taken at per cwt.; turning-piece to arches at per foot run, or number them.

At per Yard Superficial.

Rendering in cement by bricklayer, brick nogging; brick or tile pavings, in sand, mortar, or cement, stating, if brick, whether flat, on edge, or herring-bone, and size and thickness of tiles; raking out joints and pointing; fair joint on brickwork, and limewhiting, or colouring.

At per Number.

Flues cored and pargeted, stops and mitres to moulded and splayed bricks; relieving and discharging arches, stating length and width of soffit and number of rings; making good to ends of door and window sills, &c.; bedding and pointing to door and window frames; ends of timbers, cut and pinned; air-bricks and ventilators built into walls, and forming apertures for same; openings left in wall for drain-pipes, &c.; chimney, pots and fixing; ranges and stoves and setting to ditto; coppers and setting; chimney-pieces, and fixing to ditto; iron door and furnace bars, and fixing.

Chimney-bars are inserted in Smith's bill.

Tile Pavings

Are measured by the yard superficial. The size and quality of tiles and method of laying should be described, or, if possible, the prime cost of the tiles, either at the manufactory or on the building, should be given. All waste should be allowed for, and joints formed with wood or other floors measured by the foot run.

Waller.

Rubble walling is generally measured by the yard cube of 27 feet; sometimes, however, it is measured by the foot superficial, the thickness being stated; it is also measured by the rod, reduced to a thickness of 13½ inches, as in brickwork.

The cause of so many methods being employed may, perhaps, be found in the fact that in the neighbourhood of London stone used for walling purposes is sold by the ton, and the labour is nearly always done by the rod, as before described.

No walls under 18 inches thick should be measured by the yard cube. All facings, cuttings, quoins, &c., are measured, and openings are deducted, as before described under the head of Bricklayer.

Mason.

All stone used as plinths, jambs, sills, heads of door and window openings, all quoins, ashlar, cornices, mullions, tracery, &c., &c., is measured by the foot cube. When hoisted over 40 feet, it should be so described. A bed and joint is taken to every block, and all plain, sunk, and moulded labours measured by the foot superficial. Throatings, splays, narrow margins, grooves for lead lights, &c., are measured by the foot run. Mitres, stoppings, cuspings, also all slate dowels, copper or other cramps, &c., are numbered. All stone over 6 feet in length has its scantling described. Pavings are measured by the foot or yard superficial, all cuttings, notchings, &c., being taken.

Stone steps, thresholds, copings, curbs, and Portland or Yorkshire stone sills, used in brick buildings, are measured by the foot run, the scantling and labour on each being carefully described. Chimney-pieces are numbered.

Slater and Tiler.

Slating and tiling is measured by the square of 100 feet superficial: 6 inches is allowed for all eaves and for cuttings to hips and valleys. Ridges, hips, and valleys, are measured by the foot run, also all pointings to eaves and verge courses, and all cement or other filletings. Slate shelves are measured by the foot superficial, the work being accurately described as sawn, planed, or rubbed, as the case may be. Joints, edges, and sinkings, are measured by the foot run; all perforations, rounded corners, &c., are numbered; slate cisterns are numbered—the size in the clear, the thickness of sides, bottom, and mode of being put together, being given.

Carpenters' Work.

Timber employed in the construction of roofs, floors, partitions, lintels, &c., and when used in large scantlings, is measured by the foot cube. Timber is generally divided into—

Timber in plates, wood bricks, and lintels.
,, framed in ground joists.
,, ,, roofs, floors, and partitions.
,, ,, and wrought.

Tie-beams, girders, or other timbers of a building over 30 feet long, are measured as before

described, but are kept separate from the items already mentioned, as are also all timbers of large scantlings.

Centering to vaults is measured by the square of 100 feet superficial; extra labour to groin points, &c., is measured by the foot run. Centering to apertures is sometimes measured by the foot superficial; but a better plan is to number each centre, giving the width of the opening, the rise, width of soffit, girth round the centre, and the purpose for which the centre is to be used, whether for rough or fair brick arches, or for stone work. Trussed centres should be kept separate; they should be numbered and described as above, and the height from floor to the springing should be given. All centering is described as "use and waste."

Battenings, or boardings under slates or lead, are measured by the square; all gutters, eaves, and barge-boards, are measured by the foot superficial. Struttings to press, springing, tilting, and other fillets, rolls for lead, &c., by the foot run. Cesspools in gutters, cut and shaped ends to timbers, &c., are numbered. Moulds required by the bricklayer are numbered and carefully described. All labours on timber should, as far as possible, be measured separately, because of the difficulty of fixing a price for same as per foot cube. Planing and moulded work is measured by the foot superficial; chamfers, grooves, scribings, &c., are measured by the foot run; mitres and stoppings are numbered.

Fences.

Wood fences are generally measured by the lineal rod of 16½ feet, giving a careful description.

Fancy fencing is measured in detail.

Joiner.

Floors are measured by the square of 100 feet superficial, the several labours and method of laying being carefully described. Chimney-breasts are deducted; hearths are not deducted when mitred borders are put round them.

Skirtings are measured by the foot run; angles, housings, scribings, returned and mitred ends, are numbered; grounds and backings are generally included with the skirting.

Sashes and frames are measured by the foot superficial, taking the total width across the frames and the total height from the bottom of the sill to top of head: the description must include thickness of the sashes, the nature of moulding on same, mode of hanging, quality of lines, weights, and pulleys; the labour to the sill and any unusual material or labour used in the frame fully described. Sash-fasteners and lifts are numbered. Shutters, back linings, back flaps, backs and elbows, soffits, grounds, and boxings, are measured by the foot superficial; elbow-caps, blind-rails, shutter-latches, butts, back-flap hinges, and shutter-bars, are all numbered. All labours, as grooves, tongues, splays, &c., required to fix the foregoing, are measured by the foot run.

Casements and frames are sometimes measured by the foot superficial, as described to sashes and frames, the thickness of casements, scantlings, of sills, heads and jambs, being carefully given, together with the several labours to each. A method that is often adopted, is to measure the casements by the foot superficial, describing the thickness, labour, number of squares, whether fixed or hung, and taking the sills, heads, mullions, and jambs by the foot run, describing the scantlings and labour to each. Linings, soffits, and window-boards over 3 inches in width are measured by the foot superficial, all others by the foot run; the several labours required for fixing same to be measured as before described to shutters and fittings. The top and bottom rails, bars, and styles of larger sashes, as for shops, &c., are measured by the foot run, all scantlings and labours being accurately described. Notchings, scribings, and returned and mitred ends to window-boards are numbered.

Doors and other framings are measured by the foot superficial, so is all joiners' work, differing in this respect from carpenters' work, the horns of framed work not being measured in joiners' work; whereas the extreme length of all timber is measured in carpenters' work. The thickness, number of panels, and all labours, are accurately described to doors and other framings. Locks and butts are numbered. Jambs, soffits, and grounds are measured by the foot superficial, thicknesses and labours being described.

Architraves are measured by the foot run; mitres are sometimes included, at others num-

bered, as also are plinths for same; dovetailed backings are numbered, their length being described.

Stairs are measured by the foot superficial, careful descriptions of the thickness of treads and risers, modes of carrying same, and all details being accurately given. Winders are measured by themselves, as an extra piece is always allowed for them. Strings are measured by the foot superficial; ramps to same are numbered. Hand-rails, newels, and balusters are measured by the foot run. Framed ends, housings, moulded terminations, returned and mitred ends are numbered. Turned or carved balusters are numbered.

Door-frames are sometimes measured by the foot cube, at others by the foot run, careful descriptions of the labours and scantlings being given. In all cases the most careful description of thickness, methods of framing, and all other labours, are absolutely necessary, in order that a true value may be obtained.

Plumber.

Lead flats, gutters, flashings, and linings of cisterns are measured by the foot superficial; the weight of lead per foot superficial being found, the total weight is easily ascertained and reduced into cwts. Lead in cisterns is kept separate from that as laid in gutters, flats, and flashings, as it is worth more per cwt., by reason of the extra labour required in fixing it. Soldered angles and copper nailings are measured by the foot run. Pipes are measured by the foot run, and the price

includes for all joints, wall-hooks, and fixings; the weight per yard of the pipe used should be ascertained. Lead soil and socket pipes are also measured by the foot run, the size of the pipe and the weight per foot superficial of the lead used to be described; the price includes for joints, as before. Pieces of bent lead soil or socket pipes are numbered. D traps, service-boxes, taps, washers, and wastes are numbered. Zinc and copper are measured by the foot superficial, the weight per foot being described.

Smith and Founder.

Wrought-iron in chimney-bars, gratings, guard-bars, flitches, screw-bolts, saddle and stanchion bars, staircase-rails, and balusters, is brought into cwts.; the price generally includes for screws, patterns, and fixing. Sometimes screws and bolts are numbered, and saddle and stanchion bars are priced out at the foot run; all labours not included in the price per cwt. are taken separate, as in other trades. Cast iron in girders, stanchions, columns, &c., &c., is brought in cwts., and is generally kept separate, *i.e.* girders from stanchions, stanchions from columns, &c., the price per cwt. includes patterns, proving, hoisting, and fixing. Hoisting and fixing is sometimes charged at per number, giving weight of girder, &c. Rain-water pipes, eaves gutters, skylight-bars, rails, railings, &c., are measured by the foot run. Heads, shoes, and bends to rain-water pipes, all outlets, angles, stopped ends, swans'-necks, &c., to eaves and gutters are numbered. Planings, turnings, and other labours to cast-iron work are taken

separately, and are never included in the price per cwt. Stoves, ranges, coppers, &c., &c., are numbered and fully described.

Plastering.

Plasterings on walls and ceilings are measured by the yard superficial of 9 feet, all openings being deducted. Reveals to windows, soffits of arches, weatherings, fascias, and other work in small faces, are measured by the *foot* superficial. Moulded cornices are measured by the foot superficial. Mitres, stoppings, &c., are numbered. It is customary to allow four mitres to internal cornices in every room; all beyond that number are taken and charged for, and are described as "extra mitres." Consoles, modillions, trusses, centre flowers, &c., are numbered; the cost of modelling is allowed for in the prices. The nature of the labours, the quality and kind of materials used, being carefully described, and any speciality of either always mentioned.

Bellhanger and Gasfitter.

Bells and pulls are numbered, a detailed description of the bell, the pull, wire, cranks, &c., being given in each case.

Glazier.

Glass is either measured by the foot superficial, or the squares are numbered and the sizes given. The former method is generally used for crown, sheet, and other thin glass; the latter for plate glass.

Where glass is measured by the foot superficial, the sizes of the squares should be described as under 4 feet, ditto 6 feet, as the case may be. Cuttings are measured by the foot run, and the price should include for patterns and risk.

PAINTER.

Painting, graining, and varnishing is measured by the yard superficial, careful descriptions of the preparations, labours and varnish being given.

Skirtings, rails, balusters, pipes, eaves, gutters, rain-water pipes, &c., are measured by the foot run. Heads, &c., to rain-water pipes, angles to eaves, gutters, sash-frames, squares, &c., are numbered.

PAPERHANGER.

Papering is measured by the foot superficial; all openings are deducted. The net amount is then reduced into pieces, and it is customary to allow one piece in seven for waste.

MORTARS. (Haswell.)

1. All mortars are much improved by being worked or manipulated; and as rich limes gain by exposure to the air, it is advisable to work mortar in large quantities, and render it fit for use by a second manipulation.

2. The use of salt water in the composition of mortar injures the adhesion of it.

3. Composition: 1 of lime to 2 or 3 of sharp sand;

4. Or, 1 part of lime, 2 parts of sand, and 1 part of blacksmith's ashes.

5. An extremely hard mortar is obtained by using 1 part of Portland cement, 1 part of ground grey lime, and 6 parts of sharp sand.

6. Lime, 1; clean sharp sand, 2·5. An excess of water in slaking the lime swells the mortar. Sand should be clean and sharp.

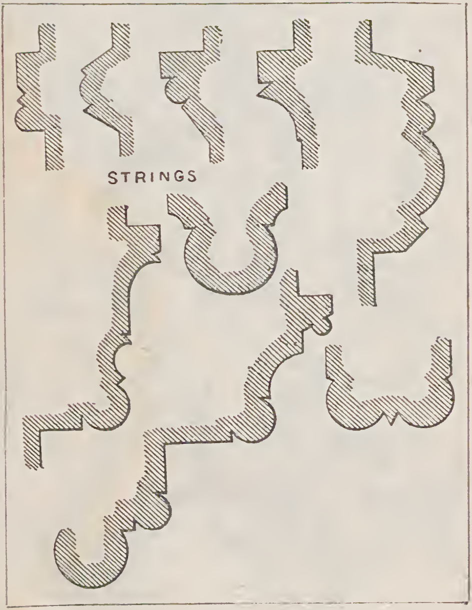
Hydraulic Mortar.

7. Smeaton's mortar, as used at the Eddystone Lighthouse, was composed of equal parts of Aberthaw lime, in the state of hydrate of lime, in fine powder, and pozzolana, also in fine powder, well beaten in mullers, until it had acquired the utmost degree of toughness.

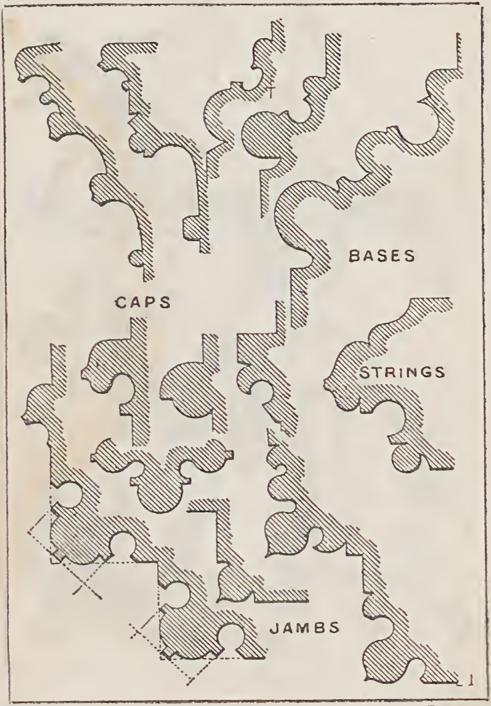
See also Limes, p. 91.

MOULDINGS.

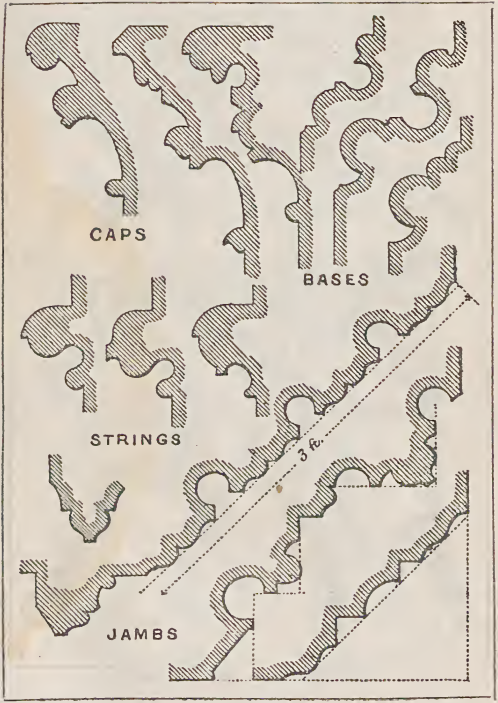
Examples of Norman.



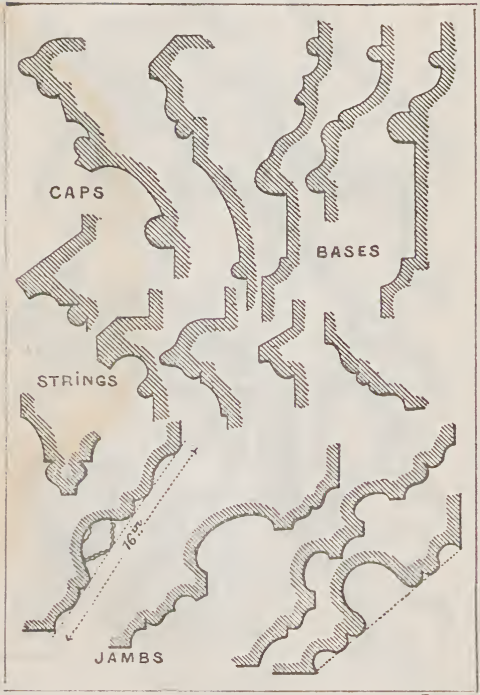
EXAMPLES OF EARLY ENGLISH.



EXAMPLES OF DECORATED.



EXAMPLES OF PERPENDICULAR.



RICKMAN'S TABLE OF NOMENCLATURE OF ENGLISH ARCHITECTURE.

Kings.	Date.	Name of Period.	Remarks.
William I.	1066	Norman	Prevailed little more than 124 years; no remains really known to be more than a few years older than the Conquest.
William II.	1087		
Henry I.	1100		
Stephen	1135		
Henry II.	1154 to 1189		
Richard I	1189	Early English	Prevailed about 118 years.
John	1199		
Henry III.	1216		
Edward I.	1272 to 1307		
Edward II.	1307	Decorated	Continued perhaps 10 or 15 years later; prevailed little more than 70 years.
Edward III.	1327 to 1377		
Richard II.	1377	Perpendicular	Prevailed about 169 years. Few, if any, whole buildings executed in this style later than Henry VIII. This style used in additions and re-buildings, but often much debased, as late as 1630 or 1640.
Henry IV.	1399		
Henry V.	1413		
Henry VI.	1422		
Edward IV.	1461		
Edward V.	1483		
Richard III.	1483		
Henry VII.	1485		
Henry VIII.	1509 to 1546		

NOMENCLATURE.—SEVEN PERIODS OF ENGLISH ARCHITECTURE. (Sharpe.)

ROMANESQUE.	A.D. A.D.	
I. Saxon Period	From —— to 1066	Prevailed — years.
II. Norman Period	„ 1066 „ 1145	„ 79 „
III. Transitional Period ..	„ 1145 „ 1190	„ 45 „
GOTHIC.		
IV. Lancet Period	„ 1190 „ 1245	„ 55 „
V. Geometrical Period ..	„ 1245 „ 1315	„ 70 „
VI. Curvilinear Period ..	„ 1315 „ 1360	„ 45 „
VII. Rectilinear Period ..	„ 1360 „ 1550	„ 190 „

PAINTERS' MEMORANDA.

A gallon of mixture, or 6 pints of raw linseed oil, 1 pint of boiled oil, 1 pint of turpentine, requires from 12 to 14 lbs. of dry paint.

These proportions vary according to circumstances.

A Gallon will cover		Superficial yds.	Superficial feet
On stone or brick, about.. ..		25 to 30	225 to 270
On compo, &c.	from	40	360
"	to	50	450
On wood	from	50	450
"	to	78	630
On well-painted surface or iron		80	720
One gallon tar, first coat.. ..		12	108
" " second coat ..		16	192

Priming.—White-lead (sometimes mixed with chalk) diluted with linseed oil.

Knotting.—Red-lead and size.

Putty.—Spanish whiting and linseed oil well beaten and kneaded into a stiff paste.

PROPORTIONS OF COLOURS FOR ORDINARY PAINTS.

Colours.	Ingredients by Weight.						
	White-lead.	Lamp-black.	Red-lead.	Red Ochre.	Verdi-gris.	Burnt Umb.	Spanish Brown.
White ..	100	—	—	—	—	—	—
Black ..	—	100	—	—	—	—	—
Green ..	25	—	—	—	75	—	—
Stone ..	99	—	—	—	—	1	—
Lead ..	98	2	—	—	—	—	—
Red ..	—	—	50	50	—	—	—
Chocolate	—	4	—	—	—	—	96

PAVIORS' MEMORANDA.

1 ton of 6-in. granite paving will cover 4 yards superficial.

1 ton of 7-in. granite paving will cover $3\frac{1}{2}$ yards superficial.

1 ton of 9-in. granite paving will cover $2\frac{1}{2}$ yards superficial.

1 ton of pebble paving will cover 4 yards superficial.

1 ton of ragstone will cover 5 yards superficial.

$13\frac{1}{2}$ cubic feet of granite = 1 ton.

14 " Purbeck = "

		Weight per foot superficial.
2-inch York paving	.. .. ..	= 26 lbs.
$2\frac{1}{2}$ " "	.. .. ..	= $32\frac{1}{2}$ "
3 " "	.. .. ..	= 39 "
4 " "	.. .. ..	= 52 "
5 " "	.. .. ..	= 65 "
6 " "	.. .. ..	= 78 "

PERSPECTIVE.

To find the vanishing points, &c., and draw a perspective representation of an object.

Let O, Fig. 34, be plan of the object to be put in perspective.

Let F O be front elevation of ditto.

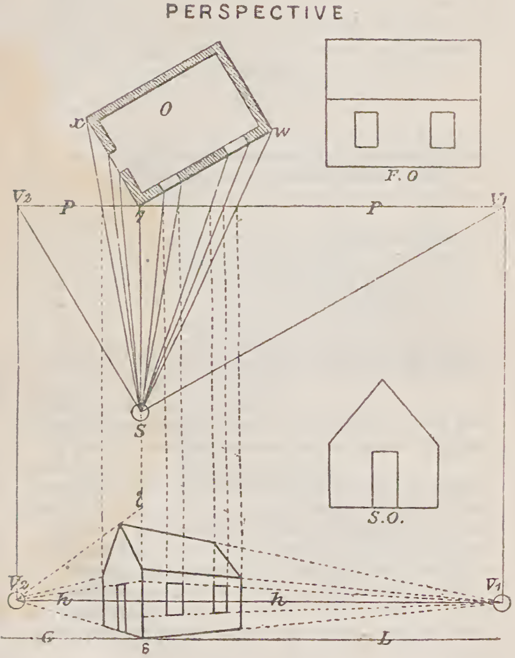
Let S O be side elevation of ditto—all to scale.

Let S be the point of sight or place where the spectator stands, and let P P be the picture plane touching the nearest point of the object.

To find the vanishing points.

From S draw a line S V^1 parallel to the front of the object $y\,w$, and continue the line until it intersects the picture plane. The point of intersection

Fig. 34.



V^1 is the vanishing point for all horizontal lines on the plane $y\,w$.

In the same way, from S draw a line S V^2 parallel to the front of the object $y\,x$. V^2 is the vanishing point for all horizontal lines on the plane $y\,x$.

From O (the object) draw lines, as shown, to the point of sight S. The points where these lines intersect the picture plane are to be transferred to the perspective drawing.

A handy way is to mark the points on a slip of paper, and transfer them to the sheet where the perspective is to be drawn.

The perspective drawing:

Let G L be the ground line; draw another line $h\,h$ parallel to it and about 5 ft. 6 (by scale) above it. $h\,h$ is the horizontal line. Transfer the vanishing points V^1 and V^2 to the horizontal line. The points where the lines drawn from O (the object to the point of sight S) intersect the picture plane are transferred to G L, the ground line of the picture.

The point y, where the object touches the picture plane, becomes $m\,l$, the measuring line, on which all heights are measured off according to the scale and drawn to the vanishing points.

PIERS, &c.

GREATEST SAFE LOAD PER SQUARE FOOT.

Granite piers	40 tons
Portland stone piers	13 „
Bath „	8 „
Brickwork in cement	3 „
Rubble masonry	2 „
Lime-concrete foundations	2½ „

PILLARS.

Brick and stone pillars should never exceed in height 12 times their thickness at the base, and the safe load should not exceed $\frac{1}{10}$th of that required to produce fracture.

Pillars of Fir (Square or Rectangular).

			Safe load per sq. in. of sectional area.
When length = 10	times the least	thickness	400 lbs.
" = 15	"	"	325 "
" = 20	"	"	260 "
" = 25	"	"	225 "
" = 30	"	"	160 "
" = 35	"	"	120 "
" = 40	"	"	90 "

Oak pillars about $\frac{1}{5}$th stronger than fir.

Wooden Pillars.

Approximate Rule for the Strength of Rectangular Pillars of Wood. (Molesworth.)

L = Length of pillar.
B = Breadth of pillar.
W = Crushing weight in lbs. per sq. in. of section.

Safe load per sq. in. of sectional area $= \frac{W}{10}$.

Material.	Values of W when L or Length is equal to				
	8 B.	12 B.	24 B.	36 B.	48 B.
Oak.. ..	5500	4600	2700	1800	900
Ash ..	6000	5000	3000	2000	1000
Red pine .	4800	4000	2400	1600	800

PILES. ('Civil Engineers' Journal.')

When the length of an oak pile does not exceed 16 times its diameter, it may be loaded permanently with a weight of 450 lbs. per square inch of its sectional area.

To estimate the weight that can be safely borne upon a pile: As many times the weight of the ram as the distance which the pile is sunk, the last blow is contained in the distance which the ram falls in making the blow, divided by 8 inches, which, when reduced to a formula, becomes

$$\frac{(R \times h \div d)}{8} = W.$$

R = Weight of ram in lbs.
h = Height of the fall in inches.
d = Distance the pile is depressed in inches.

Example.—A ram weighing 3500 lbs., falling 42 inches, depresses a pile 4·2 inches. Then

$$\frac{3500 \times (42 \div 4 \cdot 2)}{8} = \frac{35000}{8} = 4375 \text{ lbs.},$$

the weight which the pile could bear with safety.

Another rule:

$$L = \frac{W H}{8 D}.$$

W = Weight of ram (generally about 4 cwt.).
D = Distance in inches that pile is driven by last blow of ram.
H = Height the ram has fallen in inches.
L = Safe load for pile in cwts.

Another rule:

The number of times that the distance driven is contained in the distance of the fall of the ram, divided by eight, is the number of times the weight of the ram that the pile will bear.

Example.—A ram weighing 5 cwt. falling 20 feet drives a pile half an inch.

$$20 \text{ feet} = 480 \text{ half inches};$$
$$480 \div 8 = 60 \times 5 = 300 \text{ cwt.}$$

PLASTERER.

2 hods plaster, &c. (about)	=	1 bushel.
2 bushels of grey lime	=	1 bag.
3 " blue lias	=	1 bag.
3 " sand	=	1 barrel or basket.
20 " "	=	1 yard.
3 " cement	=	1 sack.
4 " Portland	=	1 cask.
5 " Roman	=	1 cask.
$\frac{3}{4}$ full bushels of Parian cement	=	1 hod.
36 bushels sand	=	1 load.
14 lbs. plaster	=	1 bag.
7 bags "	=	1 bushel.
$1\frac{1}{4}$ bushel plaster	=	1 cwt.
3 cwt. Portland cement	=	1 cask.
10 cwt. fire-clay	=	1 cask.
1 firkin plaster	=	$\frac{3}{4}$ cwt.
1 " of double size	=	48 lbs.
2 dozen whiting	=	1 cwt.
3 bundles of laths	=	1 load.

1 bundle of laths contains (nominally) 500 feet.

Single fir laths are less than $\frac{1}{4}$ in. thick.

Double fir laths are about $\frac{3}{8}$ in. thick.

1 bundle of laths and 500 nails will cover about 5 superficial yards.

12 lbs. whiting, $\frac{1}{2}$ lb. blue-black, $1\frac{3}{4}$ gal. of size are required for 100 yards (superficial) "once" done; 21 lbs. of whiting, $\frac{3}{4}$ lb. blue-black, $2\frac{3}{4}$ gals. of size, if "twice" done.

Thickness of Compo.	$\frac{1}{2}$ Inch.	$\frac{3}{4}$ Inch.	1 Inch.
	yards.	yards.	yards.
1 bushel of cement . . will cover	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{7}$
1 ditto of ditto and 1 of sand ,,	$4\frac{1}{2}$	3	$2\frac{1}{4}$
1 ditto of ditto and 2 ,, ,,	$6\frac{3}{4}$	$4\frac{1}{2}$	$3\frac{1}{3}$
1 ditto of ditto and 3 ,, ,,	9	6	$4\frac{1}{2}$

$\frac{3}{4}$ inch is the usual thickness.

1 cubic yard of chalk lime, 2 yards of road drift or sand, and 3 bushels of hair will cover 75 yards of render, and set on brick, and 70 yards on lath, or 65 yards plaster or render, two coats, and set on brick, and 60 yards on lath. Floated work will require about the same as two coats, and set.

Coarse Stuff.—Common lime mortar, with a small quantity of hair; or, by volumes, lime paste, 1 part; sand, 2 to $2\frac{1}{4}$ parts; hair, $\frac{1}{6}$ part.

Fine Stuff.—Lime paste, slaked to a paste, with a moderate quantity of water, afterwards diluted to the consistency of cream, and then allowed to harden by evaporation to the required

consistency for working. When mixed with sand or plaster of Paris it is used for the finishing coat.

Gauged Stuff is composed of from 3 to 4 parts of fine stuff and 1 part plaster of Paris, in proportions regulated by the rapidity required in hardening. For cornices, &c., the proportions are equal parts of each (fine stuff and plaster).

PLUMBER.

Cast lead is made in sheets about 6 feet wide and 16 or 18 feet long. Milled lead in 7-feet widths and about 25 feet long.

THICKNESS OF LEAD.

lbs.	inches.	lbs.	inches.
4 =	·068	7 =	·118
5 =	·085	8 =	·135
6 =	·101	9 =	·152

DIAMETER AND BORE OF STRONG LEAD PIPES.

Bore.	Outside Diam.	Bore.	Outside Diam.
½-in. pipe	⅞ inch.	1½-in. pipe	2 inches.
¾ ,,	1⅛ ,,	2 ,,	2½ ,,
1 ,,	1⅜ ,,	2½ ,,	3 ,,
1¼ ,,	1⅝ ,,		

SOLDER REQUIRED FOR JOINTS.

½-in. pipe	¾ lb.	1½-in. pipe	1¾ lb.
¾ ,,	1 ,,	2 ,,	2¼ ,,
1 ,,	1¼ ,,	2½ ,,	2¾ ,,
1¼ ,,	1½ ,,		

WEIGHT OF LEAD PIPE.

	Light.	Middling.	Strong.
	lbs.	lbs.	lbs.
$\frac{1}{2}$-in. pipe (15-ft. lengths) ..	15	17	22
$\frac{5}{8}$-in. „ „ „ ..	17	20	24
$\frac{3}{4}$-in. „ „ „ ..	24	28	32
1-in. „ „ „ ..	36	42	50
$1\frac{1}{4}$-in. pipe (12-ft. lengths) ..	36	42	52
$1\frac{1}{2}$-in. „ „ „ ..	48	56	64
$1\frac{3}{4}$-in. „ „ „ ..	76	84	96
2-in. „ „ „ ..	84	96	112

Expansion of lead by heat (32° to 212°) = 1 part in 349.

No sheet of lead should be laid a greater length than 12 feet in one piece, or without a drip, to allow for expansion and contraction.

POINTING.

Tuck pointing is the joints well raked out and filled in again with blue mortar, and the courses of the brickwork marked with the trowel, and then plaster is inserted in the joints and finished, projecting of a parallel width.

Flat pointing is raking out the joints, and filling in again with blue mortar.

PORTLAND CEMENT.

Tensile strength, 600 lbs. on $2\frac{1}{4}$ square inches.

Very strong Portland cement is heavy, weighing about 110 lbs. per bushel, and sets slowly.

Quick-setting cement has generally too much clay in its composition, and is of a brownish colour, and is weaker than the other. It should only have sufficient water to reduce it to a paste.

Proportionate strength of Portland cement mixed with sand to neat cement:—

1 of sand to 1 of cement, $\frac{3}{4}$ths the strength of neat cement.

2 of sand to 1 of cement, one-half the strength of neat cement.

3 of sand to 1 of cement, $\frac{1}{3}$rd the strength of neat cement.

4 of sand to 1 of cement, $\frac{1}{4}$th the strength of neat cement.

5 of sand to 1 of cement, $\frac{1}{6}$th the strength of neat cement.

Roman cement, about $\frac{1}{3}$rd the strength of Portland. See also CEMENTS, p. 29.

POZZOLANA.

Used in the preparation of mortar (see MORTARS) for docks, quays, foundations, and in hydraulic work, required to be kept dry, and for preventing filtration. The price per cargo on board ship at ports in the United Kingdom is about 1*l.* 13*s.* per ton.

PREPARATION FOR PREVENTING WET PENETRATING WALLS CONSTRUCTED OF BRICK OR STONE.

$2\frac{1}{2}$ lbs. of soft soap.
1 lb. rock alum.
1 gallon linseed oil.

The soap and oil to be boiled over a good fire a considerable time, till perfectly amalgamated. The alum to be finely pounded and mixed with the oil in small quantities at a time, and the

mixture is to be constantly stirred until the alum is incorporated with the oil and soap. When this is done, the mixture is to be strained off into cans for use. The mixture requires particular attention, both in preparing and applying it, to ensure success. It is very important the walls should be perfectly dry when applied, and it must be applied slowly and carefully on the surface to be covered.

PRESERVATION OF WOOD. ('Civil Engineers' Journal.')

Kyanizing.—Kyan's specific solution: 1 lb. of chloride of mercury to 4 gallons of water. Long immersion in the liquid in open vats, or great pressure upon both solution and wood, in large wrought-iron tanks, is necessary for the complete injection of the liquid.

The durability of well-Kyanized timber has been proved.

Burnettizing.—A solution of chloride of zinc—1 lb. of salt to 10 gallons of water—is forced into the wood under a pressure of 150 lbs. per square inch.

Boucherie's Process.—A solution of sulphate of copper 1 lb. to water $12\frac{1}{2}$ gallons, or pyrolignite of iron 1 gallon to water 6 gallons. Application: one end of the green stick is enclosed in a close-fitting collar, to which is attached an impervious bag communicating through a flexible tube with an elevated reservoir containing the salt liquid. Hydrostatic pressure soon expels the sap at the opposite end of the log. When the solution makes its appearance also, the process is complete.

Eighty thousand sleepers of the most perishable woods impregnated with this solution were laid down on French railways, and after nine years' exposure were found as perfect as when laid.

Both of the last-named processes are comparatively cheap.

Creosoting, or Bethell's process, subjects the timber and dead oil, enclosed in huge iron tanks, to a pressure varying between 100 and 200 lbs. per square inch—about 12 hours.

From 8 to 10 lbs. of oil are thus injected into each cubic foot of wood. Timber thus prepared is not affected by exposure to air and water, and requires no painting.

Coal-tar.—While an external application of coal-tar promotes the preservation of *dry timber*, nothing more rapidly hastens decay than such a coating upon the surface of green wood—a mistake often made, and dry rot, instead of wet rot, does the work of destruction. Farmers often resort to the latter method for the preservation of fence posts; but unless they discriminate between *green* and *seasoned* timber, the operation will prove injurious instead of beneficial.

RANSOME'S PROCESS FOR PRESERVING STONE.

The stone or other material is coated or saturated wholly or superficially with a solution of soluble silicate, and has afterwards applied to it a solution of chloride of calcium, by which an insoluble silicate of lime is formed in the body of the stone. In place of a soluble silicate and

chloride of calcium, other preparations may be used; the invention consisting in the application in succession of two solutions, which, by mutual decomposition, produce an insoluble substance, which is deposited in the structure and on to the surface of the stone or other material. Ransome's process, it is said, not only prevents new stone from decaying, but effectually prevents the further decay of that which is already rapidly approaching disintegration. The efficacy of this mineral is not confined to stone alone, but may be applied to brick, lime, stucco, &c., with equally effective results.

RAINFALL PER ANNUM. (Society of Engineers.)

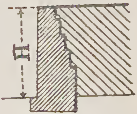
	Inches.
Cambridgeshire	22
Ashton (Lancashire)	40
Belfast	32
Bolton	50
Dublin	45
Glasgow	60
Greenock	60
Huddersfield	33
Liverpool	55·5
Macclesfield	40
Manchester	37
Oldham	35
Paisley	56·33
Preston	43
Plymouth	44
Southampton	23

RETAINING WALLS. (J. T. Hurst.)

DIAGRAM SHOWING THE SECTION OF WALL USUALLY ADOPTED IN PRACTICE.

The thickness for about $\frac{1}{3}$rd of the height from base is made equal to $\frac{H}{3}$, and it is reduced towards the top in regular offsets at the back. The face is generally made to batter from 1 in 6 to 1 in 10.

Fig. 35.



Retaining walls should be well drained at the back and have "weep holes," in the proportion of one to every superficial yard of wall, to let the water escape.

ROLLED IRON JOISTS. See also pp. 81 to 84.

TABLE SHOWING SAFE LOAD IN TONS DISTRIBUTED, CALCULATED AT $\frac{1}{4}$TH THE BREAKING WEIGHT.

Depth of Joist.	Size of Flange.	Safe Load for Different Spans.			
		10 feet.	15 feet.	20 feet.	25 feet.
inches.	inches.	tons.	tons.	tons.	tons.
5	$2 \times \frac{1}{2}$	1·65	—	—	—
6	$2\frac{1}{2} \times \frac{1}{2}$	2·5	1·65	1·25	—
7	$3 \times \frac{1}{2}$	3·5	2·25	1·75	1·25
8	$3 \times \frac{5}{8}$	5·0	3·25	2·5	2·0
9	$4 \times \frac{3}{4}$	9·	6·	4·5	3·5
10	$4\frac{1}{2} \times 1$	15·	10·	7·5	6·

ROOFS.

SCANTLINGS OF TIMBER ROOFS. (Tredgold.)

S = Span of roof in feet.
L = Length of piece in feet.
A = Area of section in inches.
B = Breadth in inches.
D = Depth in inches.

King-post roofs are adopted from 20 to 30 feet span.
Queen-post „ „ 30 to 45 „

KING POSTS.

$$A = L\,s \times 0\cdot 12 \text{ for fir, or by } 0\cdot 13 \text{ for oak.}$$

$$B = \frac{A}{D}. \qquad D = \frac{A}{B}.$$

Or,

Rule.—Multiply the length of the post in feet, by the span of the roof in feet, and the product multiplied by the decimal 0·12 for fir, or by 0·13 for oak, will give the area of the king post in inches. The area divided by the breadth will give the thickness, or by the thickness will give the breadth.

When a wrought-iron rod is used instead of wooden king post, to find the diameter of rod—

Rule.—Multiply the square root of the span of roof in feet by 0·2, and the result will give the diameter of rod in inches.

Figs. 36 and 37 show the usual method of framing a king-post roof.

Fig. 36,

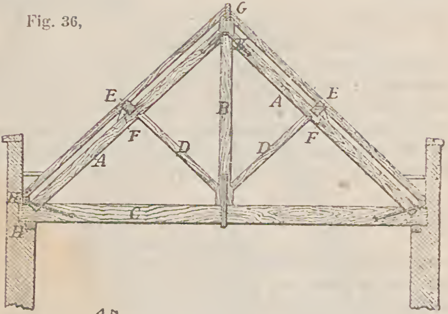
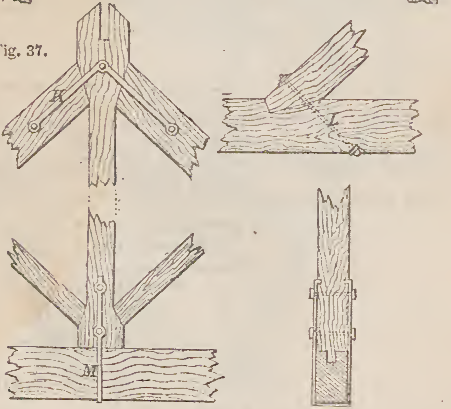


Fig. 37.



For explanation, see following page.

A is the principal rafters.
B ,, king post.
C ,, tie-beam.
D ,, struts.
E ,, purlins.
F ,, cleats to same.
G ,, ridge board.
H H ,, roof plate and wall plate.
K ,, wrought-iron straps at apex of principal rafters.
L ,, wrought-iron bolt at feet of principal rafters.
M ,, wrought-iron strap at bottom of king post.

Queen Posts.

$A = Lp \times 0\cdot27$ for fir, or $0\cdot32$ for oak, p being the length in feet of that part of the tie-beam supported by the queen post, generally half the span.

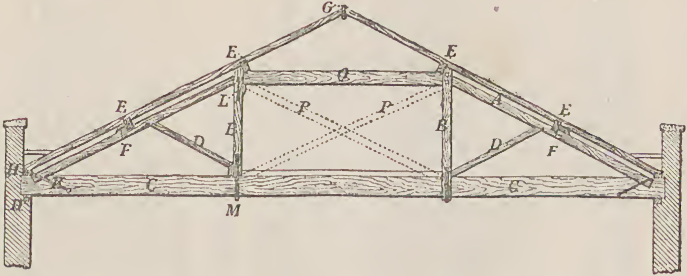
Or,

Rule.—Multiply the length of the queen post in feet, by that part of the length of the tie-beam it supports, also in feet; the product multiplied by the decimal 0·27 for fir, or by 0·32 for oak, will give the area of the queen post in inches. This area divided by the breadth will give the thickness, and by the thickness will give the breadth.

Fig. 38 shows the usual method of framing a queen-post roof.

[ROO

Fig. 38.



A	is the	principal rafters.
B	,,	queen posts.
C	,,	tie-beams.
D	,,	struts.
E	,,	purlins.
F	,,	cleats to same.
G	,,	ridge board.
H H	is the	roof and wall plates.
K, L, and M	is the	wrought-iron straps and bolts.
O	is the	straining beam.
P	,,	diagonal braces used to large spans.

Tie-Beam.

$D = \dfrac{l}{\sqrt[3]{B}} \times 1 \cdot 47$ for fir, or $1 \cdot 52$ for oak, l being the length in feet of the longest unsupported part.

Or,

Rule.—Divide the length of the longest unsupported part by the cube root of the breadth, and the quotient multiplied by $1 \cdot 47$ for fir, or by $1 \cdot 52$ for oak, will give the depth required in inches.

Example.—The length of the largest unsupported part of the tie-beam in a king-post roof of 28 feet span, as Fig. 36, is, say 14 feet; let the thickness be 6 inches. Then the cube root of 6 is $1 \cdot 81$, therefore $\dfrac{14 \times 1 \cdot 47}{1 \cdot 81} = 11\frac{1}{2}$ inches (nearly), the depth required.

When the tie-beam carries a floor, the rule is the same as for girders.

Principal Rafters.

When there is a king post,

$$D = \frac{L^2 s}{B^3} \times \cdot 096 \text{ for fir.}$$

Or,

Rule.—Multiply the square of the length of the rafter in feet, by the span in feet, and divide the product by the cube of the thickness; the quotient multiplied by $\cdot 096$ will give the depth in inches for fir.

When there are two queen posts,

$$D = \frac{L^2 s}{B^3} \times 0 \cdot 15 \text{ for fir.}$$

Or,

Rule.—Multiply the square of the length of the rafter in feet, by the span in feet, and divide the product by the cube of the thickness in inches; the quotient multiplied by 0·15 will give the depth in inches for fir.

STRAINING BEAM.

The depth should be to the thickness as 10 to 7 as nearly as possible.

$$D = \sqrt{L s^{\frac{1}{2}}} \times 0 \cdot 9 \text{ (fir).} \qquad B = 0 \cdot 7\, D.$$

Or,

Rule.—Multiply the square root of the span in feet, by the length of the straining beam in feet, and extract the square root of the product; this root multiplied by 0·9 will give the depth in inches for fir. To find the thickness, multiply the depth by the decimal 0·7.

STRUTS AND BRACES.

$$D = \sqrt{L p^{\frac{1}{2}}} \times 0 \cdot 8 \text{ (fir).} \qquad B = 0 \cdot 6\, D,$$

p being the length in feet of that part of the principal rafter supported by the strut.

Or,

Rule.—Multiply the square root of the length

of the rafter supported, in feet, by the length of the brace or strut in feet, and the square root of the product multiplied by $0 \cdot 8$ for fir will give the depth in inches. The depth multiplied by the decimal $0 \cdot 6$ will give the breadth.

PURLINS.

$$D = \sqrt[4]{L^3 C} \text{ fir, or by } 1 \cdot 04 \text{ for oak,}$$
$$B = 0 \cdot 6\, D,$$

C being the distance in feet that the purlins are apart.

Or,

Multiply the cube of the length of the purlin in feet, by the distance they are apart in feet, and the fourth root of the product will give the depth in inches for fir. The depth multiplied by the decimal $0 \cdot 6$ will give the breadth.

COMMON RAFTERS.

$$D = \frac{L}{B^{\frac{1}{3}}} \times 0 \cdot 72 \text{ for fir, or } 0 \cdot 74 \text{ for oak.}$$

When the rafters are 2 inches thick,

$$D = \cdot 57\, L \text{ for fir.}$$

Or,

Rule.—Divide the length of the bearing in feet, by the cube root of the breadth in inches, and the quotient multiplied by $0 \cdot 72$ for fir, or by $0 \cdot 74$ for oak, will give the depth in inches.

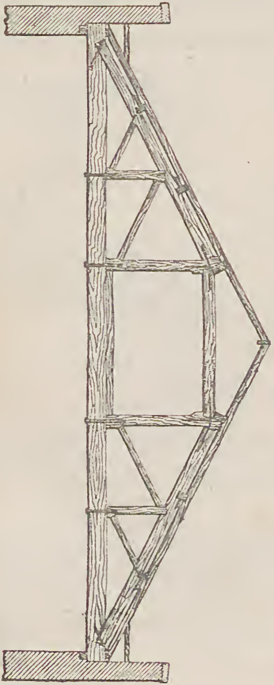


Fig. 39.

Wooden Roofs.—Table of Scantlings.

	Span in feet.	Tie-Beam.	Principal Rafter.	King Post.	Queen Post.	Small Queens.	Straining Beam.	Struts.
		inches.	inches.	inches.	inches.	inches.	inches.	inches.
A	20	$9\frac{1}{2} \times 4$	4×4	4×4	—	—	—	$3\frac{1}{2} \times 2\frac{1}{4}$
A	22	$9\frac{1}{2} \times 5$	5×3	5×3	—	—	—	$3\frac{3}{4} \times 2\frac{1}{2}$
A	24	$10\frac{1}{2} \times 5$	5×4	5×4	—	—	—	$4 \times 2\frac{1}{2}$
A	26	$11\frac{1}{2} \times 5$	$5\frac{1}{2} \times 4$	$5\frac{1}{2} \times 4$	—	—	—	$4\frac{1}{2} \times 2\frac{1}{2}$
A	28	$11\frac{1}{2} \times 6$	6×4	6×4	—	—	—	$5 \times 2\frac{3}{4}$
A	30	$12\frac{1}{2} \times 6$	$6 \times 4\frac{1}{2}$	$6 \times 4\frac{1}{2}$	—	—	—	5×3
B	32	$10\frac{1}{2} \times 4\frac{1}{2}$	$5 \times 4\frac{1}{2}$	—	$4\frac{1}{2} \times 4$	—	$6\frac{3}{4} \times 4\frac{1}{2}$	$4 \times 2\frac{1}{4}$
B	34	$10\frac{1}{2} \times 5$	$5\frac{1}{2} \times 4\frac{1}{2}$	—	$4\frac{1}{2} \times 4\frac{1}{2}$	—	$7 \times 4\frac{1}{2}$	$4 \times 2\frac{1}{2}$
B	36	11×5	6×5	—	$5 \times 4\frac{1}{2}$	—	7×5	$4\frac{1}{4} \times 2\frac{1}{2}$
B	38	$11 \times 5\frac{1}{2}$	$6\frac{1}{2} \times 5$	—	5×5	—	$7\frac{1}{2} \times 5$	$4\frac{1}{2} \times 2\frac{1}{2}$
B	40	$12 \times 5\frac{1}{2}$	$7 \times 5\frac{1}{2}$	—	$5 \times 5\frac{1}{2}$	—	$8\frac{1}{2} \times 5\frac{1}{2}$	$4\frac{1}{2} \times 2\frac{3}{4}$
B	43	12×6	7×6	—	6×5	—	$8\frac{1}{2} \times 6$	$4\frac{1}{2} \times 3$
B	46	13×6	7×6	—	$6 \times 5\frac{1}{2}$	—	$8\frac{1}{2} \times 6$	$4\frac{3}{4} \times 3$
C	50	13×8	$8\frac{1}{2} \times 6$	—	$6\frac{1}{2} \times 6$	6×4	9×6	$4\frac{1}{2} \times 3$
C	55	14×9	$8\frac{1}{2} \times 7$	—	$7 \times 6\frac{1}{2}$	7×4	10×6	5×3
C	60	15×9	9×7	—	$7\frac{1}{2} \times 7$	7×4	10×7	$5\frac{1}{4} \times 3$

The roofs within the bracket A are king-post roofs, as Fig. 36. The roofs within the bracket B are queen-post roofs, as Fig. 38. The roofs within the bracket C are queen-post roofs, as Fig. 39.

SCANTLINGS OF PURLINS.

Bearing in feet.	Distance apart in feet.		
	7	8	9
6	6 × 4	$6\frac{1}{2}$ × 4	$6\frac{1}{2}$ × $4\frac{1}{2}$
7	7 × 4	$7\frac{1}{2}$ × 4	$7\frac{1}{2}$ × $4\frac{1}{2}$
8	7 × 5	$7\frac{1}{2}$ × 5	$8\frac{1}{2}$ × 5
9	$8\frac{1}{2}$ × 5	$8\frac{1}{2}$ × $5\frac{1}{2}$	9 × $5\frac{1}{2}$
10	$8\frac{1}{2}$ × 6	9 × 6	$9\frac{1}{2}$ × 6
12	$10\frac{1}{2}$ × $6\frac{1}{2}$	$10\frac{1}{2}$ × 7	11 × 7

COMMON RAFTERS (12 in. apart).

For a bearing not exceeding—

		Scantling of rafter.
6 feet	..	$3\frac{1}{2}$ in. × $2\frac{1}{4}$ in.
8 feet	..	4 in. × $2\frac{1}{2}$ in. or $4\frac{1}{2}$ in. × $2\frac{1}{4}$ in.
10 feet	..	5 in. × $2\frac{1}{2}$ in.
12 feet	..	$6\frac{1}{2}$ in. × $2\frac{1}{2}$ in. or 6 in. × 3 in.
14 feet	..	$7\frac{1}{2}$ in. × $2\frac{1}{2}$ in. or 7 in. × 3 in.

SAFE LOAD ON PIERS, &c. See PIERS, p. 116.

SCARFED JOINTS IN BEAMS, &c. (Tredgold.)

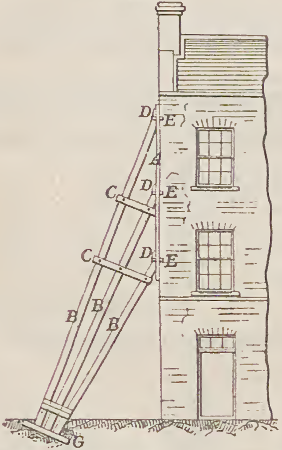
THE PROPORTION OF LENGTH OF SCARF TO DEPTH.

	Without Bolts.	With Bolts.	With Bolts and Indents.
Oak, ash, elm ..	6 D	3 D	2 D
Fir	12 D	6 D	4 D

SHORING.

Figs. 40 and 41 show the usual method of shoring dangerous structures.

Fig. 40.



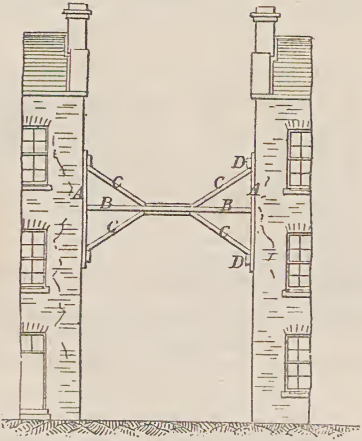
A, Fig. 40, is a plank about 9 in. × 3 in. placed against wall.

E, E, E, are the NEEDLES, about 6 × 4, passing through the plank, and leaving about 5 in. projection outside, and let the same distance into the wall.

D, D, D, are CLEATS spiked to the plank on the upper side of each needle.

B, B, B, are the SHORES; size from 6 in. × 6 in. to 12 in. × 6 in. according to the size of building; fixed as block G buried in the ground, and under the needles. The longest shore is called the "*top raker*," the middle one the "*middle raker*," and the other the "*bottom shore*."

Fig. 41.



SILK.

When a cordage is required of the least possible weight for a given strength or for a given resilience, without regard to expense, then, without a doubt, the best material is silk. (Rankine.)

SLATER.

TABLE OF THE SIZE OF SLATES AND PROPORTIONS USED IN ROOFING.

Name of Slate.	Size.	Gauge.	No. of Squares covered by 1200.	No. required to cover 1 Square.	1st Quality. Weight per Thousand (1200).
	in. in.				cwt.
Doubles ..	12 × 8	4½	2·8	430	17½
,, ..	13 × 6	5	2½	480	15
Ladies ..	14 × 12	5½	5	240	31
,, ..	15 × 8	6	4	300	25
Viscountess	18 × 10	7½	6	200	34
Countess ..	20 × 10	8½	7	171	40
Marchioness	22 × 12	9½	9⅓	130	52
Duchess ..	24 × 12	10½	10	125	60

Name.	Size.	No. of Squares covered by 1 Ton.
	in. in.	
Queens ..	Lengths 27 to 36 × irregular widths	2½
Imperials	,, 27 to 36 × ,,	2
Rags ..	,, random × ,,	2

SMITH.

To Prevent Rust.

Iron straps and bolts should before use be heated to a blue heat, and then struck over with raw linseed oil.

A strap	1 in.	wide	may be	$\frac{3}{16}$ in.	thick.
,,	$1\frac{1}{2}$	,,	,,	$\frac{5}{16}$	,,
,,	2	,,	,,	$\frac{3}{8}$	,,

Weight of Common Furnace-bars.

10-in. bars	.. .. .. each	=	$3\frac{1}{2}$ lbs.
12-in. ,,	.. .. .. ,,	=	$4\frac{3}{4}$,,
14-in. ,,	.. .. .. ,,	=	$7\frac{1}{2}$,,
18-in. ,,	.. .. .. ,,	=	$9\frac{1}{2}$,,
22-in. ,,	.. .. .. ,,	=	$15\frac{1}{2}$,,
27-in. ,,	.. .. .. ,,	=	$21\frac{1}{2}$,,
36-in. ,,	.. .. .. ,,	=	33 ,,

Rain-water pipes are made in 6-ft. and 3-ft. lengths.

Eaves gutters are made in 6-ft., 4-ft., 3-ft., and 2-ft. lengths.

Size of Bolts, Nuts, &c.

Thickness of nut = $1\frac{1}{8}$ diameter of bolt.

Thickness of head = $\frac{3}{4}$ diameter of bolt.

Diameter of head and nut, square or hexagon, from side to side = $1\frac{3}{4}$ diameter of bolt.

Ditto ditto, from angle to angle = 2 diameters of bolt.

Washers, half the thickness of head and twice the area.

For weight of wrought and cast iron, &c., in pipes and sheets, see WEIGHTS.

SOUND, VELOCITY OF. See VELOCITY, p. 206.

STAIRS.

PROPORTION OF TREADS TO RISERS.

					Inches.
Breadth of tread		7 in.,	height of riser		8
,,	,,	8 ,,	,,		$7\frac{1}{2}$ to 8
,,	,,	9 ,,	,,		7 ,, $7\frac{1}{2}$
,,	,,	10 ,,	,,		$6\frac{1}{2}$,, 7
,,	,,	11 ,,	,,		6 ,, $6\frac{1}{2}$
,,	,,	12 ,,	,,		$5\frac{1}{2}$,, 6
,,	,,	13 ,,	,,		5 ,, $5\frac{1}{2}$
,,	,,	14 ,,	,,		$4\frac{1}{2}$,, 5
,,	,,	15 ,,	,,		4 ,, $4\frac{1}{2}$

STONE.

The following materials will on an average weigh 1 ton:—

		Cubic feet.
Bath stone		19·5
Portland stone	from	15·25 to 17·60
Ketton stone	,,	17·5 ,,
Bramley Fall stone ..	,,	15·75 ,,
Abercarne stone		13·33
Craigleith stone		15·5
Bolsover stone		14·75
Cadely stone		17·75
Granite stone		13·5

TABLE OF WEIGHT AND LABOUR ON BUILDING STONES.

Materials.	Weight per Cubic Foot in Lbs.	Labour in proportion to Portland.
OOLITES.		
Portland	147	1·0
Ancaster	139¼	0·6
Bath	123	0·5
Doulting	134	0·75
Haydor	133½	0·5
Ketton	128¼	0·65
Taynton	136	0·9
SANDSTONES.		
Abercarne and Newbridge	168	1·42
Barbadoes	146¼	1·23
Binnie	140	1·0
Craigleith	146	—
Duke's Quarry, Derby	144	1·1
Gatton	103	0·7
Giffneuch	143½	0·85
Heddon	130¾	1·1
Park Spring	151	1·23
Scotgate Head	158	1·2
Whitby	126¾	0·75 to 0·95
LIMESTONES.		
Chilmark or Tisbury	153½	1·0 hard 0·6 soft
Seacombe	151	1·16
Totternhoe	116½	0·47
MAGNESIAN LIMESTONES.		
Brodsworth	133¾	0·86
Huddleston	137¼	0·95
Roche Abbey	139	1·0

BUILDING STONES. From the Report of the Select Committee

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Abercarne & Newbridge, near Newport, Monmouthshire.	Quartz and siliceous grains, moderately fine, with argillo-siliceous cement; micaceous, and with remains of fossil plants.	Dark bluish grey.	167 15
Ball Cross	Siliceous grains, with argillo-siliceous cement; occasionally micaceous, ferruginous.	Ferruginous brown striped, and zoned in deeper tints.	.. ..
Barbadoes, Tintern, Monmouthshire.	Fine and coarse quartz, and other siliceous grains, with argillo-siliceous cement, ferruginous spots, and plates of mica.	Light greyish brown.	146 12
Binnie, Uphall, and in Linlithgowshire.	Fine quartz grains, with argillo-siliceous cement, micaceous, chiefly in planes of beds.	Brownish grey.	140 1
Bolton's Quarry, Aislaby, Yorkshire.	Moderately fine siliceous grains, with argillo-siliceous cement, plates of mica, and spots of carbon disseminated.	Warm light brown.	126 11

Further memoranda of stones in

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
1 to 10 tons, in thicknesses of 5 feet.	4½*d.*, or 5*s.* per ton.	*s. d.* *s. d.* 1 3 to 2 3	Old churches and modern buildings in vicinity; new docks at Newport and Cardiff.
.. ..	.. ..	.. ..	At Chatsworth and Bakewell.
1 to 10 tons, thickest bed 10 to 12 feet.	Old quarry closed; new one opened in neighbourhood.		Tintern Abbey.
Bands, 14 to 18 ft. thick.	1*s.* 1*d.* to 2*s.* for largest blocks	2 9 to 3 8	New club-house in Prince's Street, Edinburgh, and numerous private houses there and in Glasgow.
100 ft. cube; top beds for house building, bottom beds for docks. Beds, 3 to 8 ft. thick.	10*d.* to 1*s.*	1 9 to 2 1	Whitby Abbey, New University Library at Cambridge, Scarborough and Bridlington Piers, Sheerness, and St. Katharine's Docks.

general use, at Masons' Prices, page 258.

BUILDING STONES.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Bramley Fall (Old Quarry), near Leeds, Yorkshire.	Quartz grains (often coarse), and decomposed felspar, with argillo-siliceous cement, mica rare; small ferruginous spots disseminated.	Light ferruginous brown.	142 3
Calverley, Tunbridge Wells, Kent.	Fine siliceous grains, with a slightly calcareous cement.	Variegated browns.	118 1
Craigleith, Craigleith Hill, near Edinburgh.	Fine quartz grains, with a siliceous cement, slightly calcareous, occasional plates of mica.	Whitish grey	145 14
Crawbank, Barrowstones, Linlithgowshire.	Fine quartzose grains, with an argillo-siliceous cement, somewhat ferruginous; disseminated mica.	Light ferruginous brown.	129 2
Duffield Bank, Duffield, Derbyshire.	Quartz grains of moderate size and decomposed felspar, with an argillo-siliceous cement; ferruginous spots, and occasionally plates of mica.	Light brown, with dark brown and purplish tints.	132 14

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
		s. *d.*	
Up to 18 tons	.. ..	.. ..	In numerous bridges, waterworks, &c.
70 or 80 ft. and upwards to 500. Beds to 3½ ft.	4*d.* to 6*d.*	1 2 to 1 4	Upper part of new church at Tunbridge Wells, and about 100 houses, &c., at Tunbridge Wells and its vicinity.
Any practicable length and breadth, from 6 in. to 10 ft. thick.	9*d.* to 2*s.* 6*d.*, according to quality.	1 10½ to 3 7½	Used extensively in public buildings in Edinburgh; the College (1580), Registry (1774), Courts of Law, Custom House, Royal Exchange, national monuments, &c.
5 ft. thick, 6 ft. broad, 10 ft. long.	1*s.* for blocks of not more than 5 cub. ft.	2 2	A Roman bridge (A.D. 140), old church of Kinneil, of the twelfth century.
150 ft.; thickest beds about 4 ft.; half the depth brown, half white.	1*s.* 1*d.* the white stone, 9*d.* the brown stone.	.. ..	St. Mary's Bridge, Mechanics' Lecture Hall, and Bishop Ryder's Church, &c.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lbs. oz.
Duke's Quarries, Holt Whatstanwell Bridge, Derbyshire.	Quartz grains, generally coarse, with decomposed felspar, and an argillo-siliceous cement; ferruginous spots.	Red, varied with green, brown, and grey.	144 8
Gatherley Moor, near Richmond, Yorkshire.	Quartz grains of moderate size, and an argillo-siliceous cement; ferruginous spots and plates of mica.	Cream	135 13
Gatton, Surrey.	Fine siliceous grains, with a calcareo-siliceous cement, containing green silicate of iron and plates of mica.	Greenish light brown.	103 1
Glammis, Forfarshire.	Siliceous grains of moderate size; cement slightly calcareous; mica abundant in planes of beds.	Purple-grey	161 2
Heddon, near Newcastle, Northumberland.	Coarse quartz grains and decomposed felspar, with an argillo-siliceous cement; ferruginous spots.	Light brown ochre.	130 11

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
.. ..	On trucks, 10*d.*	At St. Pancras, 1*s.* 7*d.*	Penitentiary at Millbank, the filling-in parts of Waterloo Bridge, and Euston Station, London.
1 to 3 tons, a bed 12 ft. deep.	*s.* *d.* 1 3 Extra large, 1 6 Random Ashlar, 1*s.* 2*d.*	*s.* *d.* 2 8 to 3 0	Aste Hall, near Richmond, and Caterick bridges over the Swale, Purse Bridge over the Tees; Skelton Castle, Darlington Town Hall, Lockburn Hall, &c.
35 to 60 ft. cube, from 4 to 10 ft. long.	Quarries closed.	.. ..	Hampton Court and Windsor Castle, &c.
Any practicable size; thickest bed, 6 ft.	0 7 to 1 0	About 19*s.* per ton.	Glammis Castle and Inverquharity Castle, supposed of the tenth century; Cortachy Castle; and in modern buildings; Lendertis House, &c.
Beds, 4 to 12 ft. thick.	0 6 to 0 10	1 8 to 2 0	Church at Heddon, steeple, 1764; Norman chancel; columns of portico to theatre, and Grey monument at Newcastle; and nearly all the buildings, ancient and modern, in and about Newcastle.

BUILDING STONES.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Hollington, Staffordshire.	Quartz grains of moderate size, with an argillo-siliceous cement; plates of mica.	Light brownish grey.	133 1
Humbie.—Humbie, Linlithgowshire.	Fine quartz grains, with siliceous cement; slightly calcareous; mica chiefly in planes of beds.	Pale grey and light brown.	White, 140 3 grey, 135 13
Locharbriggs, Dumfries.	Red freestone.	Light red.	.. ..
Longannet, nr. Kincardine, in Perthshire.	Fine quartz grains, with siliceous cement, containing oxide of iron; a few plates of mica.	Light ferruginous brown.	131 11
Munlochy, in Ross-shire.	Fine siliceous grains, with an argillo-siliceous cement; micaceous.	Red and variegated.	160 9
Mylnefield, or Ringoodie, near Dundee, in Perthshire.	Fine siliceous grains, with a calcareo-argillo-siliceous cement; micaceous in planes of beds.	Purplish grey	160 0
Park Spring, near Leeds, Yorkshire.	Fine quartz grains, and decomposed felspar, with an argillo-siliceous cement; mica chiefly in planes of beds.	Light ferruginous brown.	151 1

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
		s. *d.*	
30 to 40 ft. sq., and 8 ft. thick.	On trucks, 1*s.* to 1 6	2 6	Trentham Hall, Drayton Manor, Heath House, and various public and private buildings in Staffordshire; Town Hall, Derby; Mear Hall, Cheshire, &c.
90 cub. ft. and upwards, if required; thickest bed, 8 ft.	.. ..	.. ..	Newliston House, Kirkliston; Dundas Castle; additions to the Royal Institution; front of Surgeons' Hall, spire of Tron Church, and various other public buildings in Edinburgh; also in Glasgow.
Any practicable size.	0 8	2 3	
4 to 5 tons; thickest bed, 5 ft.	Quarry closed. See Blair quarry in Masons' Prices.		Staadt House, Amsterdam; Exchange, Edinburgh; Tulle Mare Castle, Perthshire, &c.
Of large size; beds, 2½ to 6 ft. thick.	0 5 to 0 5½	.. ..	Cathedral Church of Ross at Fortrose, A.D. 1124; Inverness old bridge, Cromwell Court, &c.
Any practicable size.	0 9 to 1 5	.. ..	Old steeple of Dundee, twelfth century, well preserved; Royal Asylum of Dundee, &c.; Bell Rock Lighthouse, Royal Asylum of Perth, Kinfaun's Castle, Castle Huntly, &c.
10 to 12 ft. long; thickest bed, 2 ft. 4 in.	0 7	2 1½ to 2 5	Commercial buildings at Leeds, from the old quarry, which is of exactly similar stone to that of this quarry.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.	
			lbs.	oz.
Pensher, nr. Houghton - le - Spring, Durham.	Coarse quartz grains, with an argillo-siliceous cement; plates of mica.	Pale whitish brown.	134	5
Pytodykes, nr. Dundee, Forfarshire.	Siliceous grains of moderate size, with a calcareo-argillo-siliceous cement; micaceous.	Purplish grey	162	8
Scotgate Head, Huddersfield, Yorkshire.	Quartz grains of moderate size, with an argillo-siliceous cement; mica in planes of beds, and occasional specks of carbon.	Light greenish grey.	158	0
Stancliffe, or Darley Dale, near Bakewell, Derbyshire.	Quartz grains of moderate size and decomposed felspar, with an argillo-siliceous cement; ferruginous spots and plates of mica.	Light ferruginous brown.	143	3
Stainton, nr. Barnard Castle, Durham. *	Fine quartz grains and decomposed felspar, with an argillo-siliceous cement; ferruginous specks and some plates of mica.	Ferruginous light brown.	142	8
Whitby Company's, Aislaby, nr. Whitby, Yorkshire.	Siliceous grains of moderate size, with an argillo-siliceous cement; some plates of mica and spots of carbon disseminated.	Light brown	126	11

* Tisbury — Calciferous — Greenish brown — 111 2

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. *d.*	*s.* *d.*	
Any practicable size; thickest bed, 20 ft.	0 $8\frac{3}{4}$	1 7	Pensher Chapel; Scotch Church, Sunderland; Sunderland Pier, Seaham Harbour, Victoria Bridge, on the Wear, &c.
Thickest bed, 3 to 4 ft.	0 10 to 1 2	2 1 to 2 5	Extensively for the works at Dundee Harbour, &c.
Thickest bed, 3 ft. 6 in.	0 8	1 2	York Castle; Bath Hotel at Huddersfield.
Of very large size	1 6 Large blocks, 2 6	.. ..	Abbey in Darley Dale; Stancliff Hall, Birmingham; Grammar School, Birmingham; and Nottingham Railway Station, &c.
15 to 20 ft. long, 2 to 8 ft. in thickness.	On rail trucks 1 8	2 6	The Round Keep of Barnard Castle; Joint Stock Bank, and Market House, Barnard Castle.
40 × 25 ft.	0 10	1 8	Some parts of Whitby Abbey; new library at Cambridge; baths and town-hall at Whitby; cemetery at Highgate.

See prices at end.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Whitby Co.'s Egton Quarries, being *Arncliffe, Julian Park, Proddams,* and *Lease Rigge*, near Whitby.	.. .. ..	Pale, to dark brown.	.. ..
Whitby Co.'s Sneaton, near Whitby.	.. .. ..	.. ..	.. ..
Whitby Co.'s Newton Dale, near Whitby.	.. .. ..	.. ..	.. ..

Building Stones.

Beer, near Axminster, Devonshire.	Chiefly carbonate of lime, friable, and with partial indurations.	Light tint of brown.	131 12
Chilmark, nr. Salisbury, Wiltshire.	Carbonate of lime, with a moderate proportion of silica, and occasional grains of silicate of iron.	Light greenish brown.	153 7

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	s. d.	
Arncliffe, 15 × 10 × 9; Proddams, 10 × 8 × 8; Lease Rigge, 10 × 6 × 5.	0 11½	1 9½	Grosmont Abbey and Bridge; Egton Bridge; London & Birmingham Railway; Whitby and Pickering Railway.
24 × 9 × 3½	1 1	1 11	Parts of Whitby Abbey, and a portion of the parapet of old Blackfriars Bridge.
6 ft. by 4 ft. and 18 in.	0 10	1 8	London; Lewisham Church.

LIMESTONES.

6 to 7 ft. long, 3 ft. wide, and 2 ft. thick.	0 9	1 7	In the churches of the vicinity; St. Peter's Church, Exeter, in exposed parts; Colyton Church, Charmouth, &c.
Blocks to 6 tons.	1 0 to 1 6	At Nine Elms 1 8 to 2 2	Salisbury Cathedral, Wilton Abbey, and many other ancient and modern buildings in the vicinity.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Hopton Wood, near Wirksworth, Derbyshire.	Compact carbonate of lime, with encrinal fragments abundant.	Warm light grey.	158 7
Seacombe, nr. Corfe Castle, Dorsetshire.	Semi-compact carbonate of lime, with fragments of shells.	Light brown	151 0
Sutton, near Bridgend, Glamorganshire.	Compact carbonate of lime, highly crystalline.	Very light cream.	136 0
Totternhoe, near Dunstable, Bedfordshire.	Calcareous and argillaceous matter in about equal portions; structure fine.	Greenish white	116 8

BUILDING STONES.

Bolsover, near Chesterfield, Derbyshire.	Chiefly carbonate of lime and carbonate of magnesia; semi-crystalline.	Light yellowish brown.	151 11

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. *d.*	*s.* *d.*	
100 ft. cube; beds vary in thickness from 3 to 10 ft.	From 2 0	.. ..	At Chatsworth, Belvoir Castle, Trentham Hall, Drayton Manor, Birmingham Grammar School, &c.
The largest, 6 to 8 ft. by 2 to 3 ft. by 3 to 4 ft.	1 2¼	1 9¼	Lighthouse at Margate; the Clockhouse, Dover Pier; prison at Winchester; at the West India Docks, forty years since; lighthouse now building on the Isle of Wight, &c.
6 tons and upwards; thickest bed, 12 ft.	Quarry closed	.. ..	Dunraven Castle, Ogmond Abbey, St. Donat's Corty, Neath Abbey, and very ancient buildings in the adjoining counties.
40 cub. ft. or upwards; 5 to 6 ft. long.	1 3	2 5	Dunstable Priory Church, Luton, and many other churches in Bedfordshire and Hertfordshire; Woburn Abbey, Fonthill House, Ashridge, &c.

Magnesian Limestones.

50 ft. cube, in beds from 8 in. to 2 ft. thick.	0 10	2 0	Southwell Church, and numerous buildings in the vicinity.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Brodsworth, near Doncaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with sub-oolitic grains; friable.	Light brown tint.	133 10
Cadeby, near Doncaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with sub-oolitic and irregularly formed oolitic grains; friable.	Cream	126 9
Huddlestone, near Sherburne, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia; semi-crystalline.	Whitish cream	137 13
Jackdaw Craig, near Tadcaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia.	Dark cream	.. ..
Roche Abbey, near Bawtry, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with occasional dendritic spots of iron or manganese; semi-crystalline.	Whitish cream	139 2
Smawse, near Tadcaster, Yorkshire (Bramham Moor).	Chiefly carbonate of lime and carbonate of magnesia; slightly crystalline.	Light yellowish brown.	127 8

Weight of Block. and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. *d.*	*s.* *d.*	
Thickest bed, 3 ft. 6 in.	Quarry not worked.	.. ..	Doncaster Old Church and Mansion-house, Brocklesby Hall, &c.
Central beds (the best), 4 ft. thick.	.. ..	1 10	Day and Martin's in High Holborn; almshouses at Edgware, &c.
50 to 250 cub. ft. Beds have been met with 4 ft. thick.	2 0	3 0	York Minster, Selby Cathedral, Huddlestone Hall, Sherburne Church, Westminster Hall, Galeforth Hall, &c.
Beds irregular, from a few inches to 3 ft.	Blocks, 10*d.*; walling stones, 2*s.* 6*d.* per yd.	.. ..	York Minster, also for the late restorations of York Minster.
7 to 16 in. thick, large blocks uncertain.	Random, 1 9 to dimensions 2 0	.. ..	Roche Abbey Church, Tickhill Castle, and Church, and Bridge, Sandbeck Hall, Selby Hall, &c.
Largest obtained, 8·0 × 3·0 × 30.	0 7	2 1½	Hull Old Church, Ripon Minster, St. Mary's Church and the Minster at Beverley, the Minster and several churches at York, &c.

BUILDING STONES.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lbs. oz.
Ancaster, near Sleaford, Lincolnshire.	Fine oolitic grains, cemented by compact, and often crystalline, carbonate of lime.	Cream	139 4
Barnack Mill, near Stamford, Northamptonshire.	Carbonate of lime, compact and oolitic, with shells, often in fragments, coarsely laminated in planes of beds.	Light whitish brown.	136 12
Bath Lodge Hill, Combe Down, nr. Bath, Somersetshire.	Chiefly carbonate of lime, in oolitic grains.	Cream	116 0
Bath Baynton Quarry, Box, near Chippenham.	Chiefly carbonate of lime, in moderately fine oolitic grains, with fragments of shells (weather bed).	Cream	123 0
Bath (Drewe's Quarry), Monkton Farleigh, near Bath.	Chiefly carbonate of lime, in oolitic grains of moderate size.	Cream	122 10
Cranmore, near Doulting, Wiltshire.	Carbonate of lime, with a few oolitic grains, and an abundance of small shells, commonly in fragments, often crystalline.	Light brown	134 4

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	s. d.	
3 to 5 tons, beds, 18 in	1 2	1 9	Wollaton Hall, Belvoir Castle, Belton House, and numerous mansions and churches in Lincolnshire.
Up to 30 ft.; beds, 9 to 18 in.	1 0	2 3	Burleigh House, Peterborough Cathedral, Croyland Abbey, and the greater proportion of churches in Lincolnshire and Cambridgeshire.
12 to 96 ft. cube; thickest bed, 4½ ft.	0 8½	1 3 to 1 5	Restoration of Henry VII.'s Chapel, twenty years since, Kennet and Avon Canal, and other works.
Up to 10 tons; thickest bed, 5 ft.	0 8½	"	Laycock Abbey, Longleat, Bowood, south front of Wilton House, Windsor Castle, &c.
120 to 125 ft.; several beds, the deepest about 4 ft. 2 in. thick.	0 8½	"	Buckingham New Palace; St. James's Sq., Bath.
Of large size; the thickest beds will work 20 in.	0 9	1 5	Cathedral of Wells, Glastonbury Abbey, &c.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lbs. oz.
Haydor, nr. Grantham, Lincolnshire.	Carbonate of lime, with oolitic grains, often crystalline.	Brownish cream.	133 7
Ketton, in Rutlandshire, near Stamford.	Oolitic grains of moderate size, slightly cemented by carbonate of lime.	Dark cream colour.	128 5
Portland (Trade Quarry), Island of Portland.	Oolitic carbonate of lime, with a few fragments of shells.	Whitish brown	.. ..
Portland (King Barrow, East End Quarry), adjoining Waycroft, Island of Portland.	Ditto	Ditto	.. ..
Portland (Vern-st. Quarry), Island of Portland.	Ditto	Ditto	134 10 top bed.
Portland (Castle's Quarry), Island of Portland.	Ditto	Ditto	.. ..

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. *d.*	*s.* *d.*	
14 ft. × 3 ft. × 4 ft.	1 2	1 9	Lincoln Cathedral, Boston Church, Grantham Church, Newark Church, and most of the churches in the neighbourhood, and in the lower part of Lincolnshire; Culverthorpe House, Belvoir Castle, &c.
In blocks up to 9 ft. long, 7 ft. wide, and 5 ft. 6 in. thick.	2 0 to 3 6	.. ..	Many of the ancient and modern buildings at Cambridge; also in the modern works of Peterborough and Ely Cathedral, and at St. Dunstan's New Church in London.
Any practicable size.	1 3 to 2 1	2 3	Various public buildings in London.
Ditto	Ditto	Ditto	Ditto.
	[See Masons' Prices, p.265.]		
Ditto	Ditto	Ditto	Ditto.
Ditto	Ditto	Ditto	Ditto.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lbs. oz.
Portland (Waycroft Quarries), Island of Portland.	Oolitic carbonate of lime, with disseminated fragments of shells.	Whitish brown.	135 8 top bed.
Portland (Maggott Quarry).	Oolitic carbonate of lime, with fragments of shells.	Ditto	.. ..
Portland (Grove Quarry, Bowers).	Ditto	Ditto	147 10 best bed, 149 5 carf.
Portland (Grove Quarry, Red Croft).	Ditto	Ditto	.. ..
Taynton, or Teynton, near Burford, Oxon.	Carbonate of lime, partly oolitic and friable, with very small fragments of shells, irregularly laminated.	Streaky brown	135 15
Wass, near Thirsk, Yorkshire.	Compact carbonate of lime, with oolitic grains and an argillo-calcareous cement; carbon disseminated.	Brown	141 11 soft, 162 8 hard.
Windrush, nr. Burford, Gloucestershire.	Fine oolitic grains, with calcareous cement, and a few fragments of shells.	Cream	118 2 soft, 125 15 hard.

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. *d.*	*s.* *d.*	
Any practicable size.	1 3 to 2 1	2 3	Goldsmiths' Hall, Reform Club House, and other public buildings in London.
Ditto	Ditto	Ditto	Various public buildings in London.
	[See Masons' Prices, p. 265.]		
Ditto	Ditto	Ditto	St. Paul's Cathedral, and several churches in London, built during the reign of Queen Anne.
Ditto	Ditto	Ditto	St. Paul's Cathedral, and many churches in London, of Queen Anne's reign.
Any practicable size; thickest bed, about 7 ft.	0 10 to 1 0	2 4	Blenheim, Cornbury Park, Barrington Park, the interior of St. Paul's, and many other churches in London and Oxford, and in various bridges in Oxfordshire.
Beds variable, about 16 in.	.. ..	.. ..	West front and a large proportion of Byland Abbey.
5 to 40 ft.; thickest bed, 2 ft. 6 in.	0 8	2 7	Windrush Church, Barrington House, and all the old buildings within many miles of the quarry.

Table of the Weight required to Crush Cubes of Stone.

(From experiments. From Parliamentary Commissioners' Report, &c.)

Materials.	Specific Gravity.	Cracking Weight.	Crushing Weight.
		lbs.	lbs.
I. Granites (2-in. cubes)			
Aberdeen (blue)	—	—	10,363
Dartmoor	—	—	12,175
Haytor	—	—	13,865
Herm	—	—	14,873
Penrhyn	—	—	7,728
Peterhead (blue)	—	—	9,666
II. Limestones (2-in. cubes).			
Marble (white)..	—	—	9,580
Bolsover	2,316	19,831	30,147·5
Bramham Moor	2,008	10,666·5	23,649·7
Brodsworth	2,093	7,366·5	18,416·5
Cadeby	1,951	5,666·5	6,516·5
Chilmark	2,410	10,285	25,500
Hamhill	2,260	6,233	16,149
Hildenley	2,098	17,565·5	19,266·5
Huddlestone	2,147	9,633	17,283
Jackdaw Craig	2,070	10,666·5	18,903
Park Nook..	2,138	7,366·5	17,283
Roche Abbey	2,134	6,800	15,583
Totternhoe	1,891	3,966	7,700

TABLE OF THE WEIGHT REQUIRED TO CRUSH CUBES OF STONE—*continued.*

Materials.	Specific Gravity.	Cracking Weight.	Crushing Weight.
		lbs.	lbs.
III. Oolites (2-in. cubes).			
Ancaster	2,182	6,800	9,350
Barnack	2,090	4,533	7,083
Haydor	2,040	4,533	7,083
Ketton	2,645	6,233	10,285
Ketton rag	2,490	14,166·5	35,983
Portland (Waycroft Quarry)	2,145	8,500	15,583
Box	1,839	5,100	5,950
IV. Sandstones (2-in. cubes).			
Bramley Fall	2,506	—	6,053
Binnie	2,194	10,766·5	20,116·5
Craigleith	2,266	17,000	31,449·5
"	2,452	—	5,480
Darley Dale, Stancliffe ..	2,628	26,014·5	28,333
Derby	—	—	3,110
Dundee	—	—	6,490
Giffneuch	2,230	13,698	19,266·5
Heddon	2,229	7,366·5	15,866
Hookstone	2,253	17,566·5	23,233
Kenton	2,247	13,698	19,831
Mansfield, or C. Lindley's (red)	2,338	8,038	20,397
Ditto (white)	2,227	10,285	20,963·5
Morley Moor	2,053	6,235	19,833
Park Spring	2,321	15,866	30,316
Redgate	2,239	15,383	23,649·7
Stanley	2,227	10,285	23,883

STRENGTH OF MATERIALS. (Experiments. Kirkaldy.)

Bricks, in Piers Four Courses High.

Description of Bricks.	Size of Pier in Bricks.	Mortar.	Failing slightly. Tons per foot super.	Entirely crushed. Tons per foot super.
Common stock, recessed.	$1\frac{1}{2}$ by $1\frac{1}{2}$	Lias lime	17	27
,, ,,	,,	,,	21	30
Red bricks, machine-made	,,	,,	20	40
,, hand-made ..	,,	,,	20	36
Galt	,,	Roman cement	24	59
,, ...	1 by 1	,,	54	72
Clark's Sudbury, machine	,,	Portland	49	76
Uxbridge red, hand-made	,,	,,	44	53

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STONE CUBES OF TWO INCHES, BEDDED ON SHEET LEAD.

Description.	Failing slightly. Tons per foot super.	Entirely crashed. Tons per foot super.
De Lank granite, Cornish.. ..	283	363
" "	279	—
" "	349	377
Guernsey	276	830
"	761	1150
Cheesewring, Cornish	295	403
" "	194	322
Portland	106	155

DOULTON FREESTONE (Quarry, Shepton Mallet, Somerset).
Experiments on Strength.

Size of Block.	Tested against the Bed.		
	Cracked with	Crushed with	Crushing Weight per Square Inch.
in. in. in.	lbs.	lbs.	lbs.
6 × 6 × 6	75,240	89,180	2,441
6 × 6 × 12	—	79,620	2,189
6 × 6 × 18	—	70,870	1,952
6 × 6 × 24	62,270	65,890	1,836
	Tested on the Bed.		
6 × 6 × 6	—	89,380	2,490
6 × 6 × 12	69,240	83,620	2,265
6 × 6 × 18	72,770	79,850	2,174
6 × 6 × 24	—	77,040	2,105

STRUTS OF WROUGHT IRON. (Rankine.)

D = Diameter in inches.
L = Length in „
S = Sectional area of metal in inches.
W = Crushing weight in tons.

When fixed at the ends—

$$W = 16\,S \div 1 + \frac{L^2}{a\,D^2}.$$

a = 3000 for a hollow tube.
a = 1000 for a cross with equal arms.
a = 1000 for an angle with equal sides.

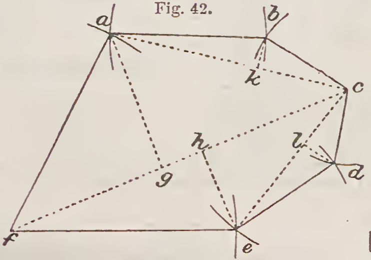
When hinged at the ends, take $\frac{a}{4}$.

SURVEYING.

To take a plan of site and to calculate the contents:—

Let Fig. 42 be the plan of site.

Fig. 42.



To take the measurements :—

Fix poles at *a b c d e f*. Commence at *c*, and measure the distance *c f*, taking the perpendiculars *h e* and *g a*; then measure *a c* and *c e*, taking the perpendiculars *k b* and *l d*; and then measure the sides *a b c d*, &c.

To plot the plan :—

1. Draw any line, and mark off on it the length of *c f*.

2. From *c* as centre, with the distance *c e* as radius, describe an arc; and from *f* as centre, with the distance *f e* as radius, intersect the arc; the intersection will give the point *e*.

3. From *c* and *f*, as centres with the distance *f a* and *c a* respectively, draw arcs intersecting to find the point *a* as before.

4. From *a* and *c* as centres with the distance *a b* and *c b* respectively as radius, find the point *b* in the same way.

5. From *c* and *e* as centres with the distance *c d* and *e d*, find the point *d* as before, which will complete the outline of the plan.

6. Draw lines from the points *a b*, *b c*, &c., as shown.

To find the area :—

1. Multiply the length *c f* by the lengths of *h e* and *g a* added together.

2. Multiply the length $a\,c$ by the perpendicular $k\,b$.

3. Multiply the length $c\,e$ by the perpendicular $l\,d$.

4. Add the three products, and half the sum will be the area.

Example :—

Let $c\,f$	=	100	feet.
$g\,a$	=	40	,,
$h\,e$	=	20	,,
$a\,c$	=	70	,,
$k\,b$	=	10	,,
$c\,e$	=	50	,,
$l\,d$	=	12	,,

Then $c\,f \times \frac{1}{2}(h\,e + g\,a) = 100 \times 30 = 3000$

$\frac{1}{2}\,a\,c \times k\,b = 70 \times 10 = 350$

$\frac{1}{2}\,c\,e \times l\,d = 50 \times 12 = 300$

Area = 3650

SURVEYORS' FEES.

Compensation Claims.

Known as "Ryde's" Scale, sometimes called "Clutton's." Railway Companies and other Corporations taking land compulsorily, almost invariably allow to the vendor, towards his surveyor's costs, according to this scale; sometimes more, in cases of peculiar difficulty. This scale is also

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used in taxing costs against the Company after a reference or an inquisition before a Jury.

COMPENSATION CLAIMS. "RYDE'S" SCALE.

£	Gs.	£	Gs.	£	Gs.
100	5	3,000	28	6,800	47
200	7	3,200	29	7,000	48
300	9	3,400	30	7,200	49
400	11	3,600	31	7,400	50
500	13	3,800	32	7,600	51
600	14	4,000	33	7,800	52
700	15	4,200	34	8,000	53
800	16	4,400	35	8,200	54
900	17	4,600	36	8,400	55
1,000	18	4,800	37	8,600	56
1,200	19	5,000	38	8,800	57
1,400	20	5,200	39	9,000	58
1,600	21	5,400	40	9,200	59
1,800	22	5,600	41	9,400	60
2,000	23	5,800	42	9,600	61
2,200	24	6,000	43	9,800	62
2,400	25	6,200	44	10,000	63
2,600	26	6,400	45	11,000	68
2,800	27	6,600	46	12,000	73

SCALE OF SURVEYORS' FEES FOR PAROCHIAL ASSESSMENT VALUATIONS.

This scale applies to occasional assessment of the annual value of hereditaments which have to be made for Overseers, Assessment Committees, and Ratepayers; each hereditament being charged a separate fee. When a whole parish or district

is assessed, a charge of $1\frac{1}{4}$ per cent. on the total gross assessments is made.

Amount of Gross Assessment.			Fee.
Not Exceeding	..	£100	5 Guineas.
"	..	200	9 "
"	..	300	12 "
"	..	400	14 "
"	..	500	15 "
"	..	600	16 "
"	..	700	17 "
"	..	800	18 "
"	..	900	19 "
"	..	1,000	20 "
"	..	1,100	21 "
"	..	1,200	22 "
"	..	1,300	23 "
"	..	1,400	24 "
"	..	1,500	25 "
"	..	1,600	26 "
"	..	1,700	27 "
"	..	1,800	28 "
"	..	1,900	29 "
"	..	2,000	30 "
Above £2,000 up to 5,000			Add One Guinea to the last-mentioned fee for every additional £100.
Above 5,000			$1\frac{1}{4}$ per cent.

SYMBOLISM.

THE HOLY APOSTLES.

S. Peter. With a key; or two keys with different wards.

S. Andrew. Leaning on the cross called from him.

S. John Evangelist. With a chalice, in which is a winged serpent. (In this case the eagle is never represented.)

S. Bartholomew. With a flaying knife.

S. James the Less. With a fuller's staff, bearing a small square banner.

S. James the Greater. With a pilgrim's hat, staff, and cockle-shell.

S. Thomas. With an arrow; or with a long staff.

S. Simon. With a long saw.

S. Jude. With a club.

S. Mathias. With a hatchet.

S. Philip. Leaning on a spear; or with a long cross in the shape of a T.

S. Matthew. With a knife or dagger.

S. Paul. With elevated sword.

S. John Baptist. With an Agnus Dei.

S. Stephen. With stones in his lap.

S. Hilary. A bishop, with three books.

S. Fabian. Kneeling at the block, the triple crown by his side.

S. Agnes. With a lamb at her feet.

S. Blaise. Holding a woolcomb; or with a woman at his feet, offering a pig.

S. Agatha. Her breast torn by pincers.

S. David. With pall and crozier, preaching on a hill.

S. Perpetua. With a child at her breast, surrounded by flames.

S. Gregory. A book in one hand, the triple crozier in the other, and a triple crown.

S. Richard. A chalice at his feet.

S. Alphege. An archbishop, with a heap of stones in his chesible.

S. Dunstan. An archbishop, with a harp in his hand.

S. Boniface. A bishop, laying an axe to the root of an oak.

S. Margaret. With a crozier in her hand, trampling on a dragon.

S. Mary Magdalene. With the alabaster box, and with loose long hair.

S. Anne. Teaching the Blessed Virgin Mary to read: her finger generally points to the words, "Radix Jesse floruit."

S. Laurence. With a gridiron.

S. Giles. A hind, with an arrow piercing her neck, standing on her hind feet, and resting her fore feet on the lap of the saint.

S. Edmund. Fastened to a tree, and pierced with arrows; the royal crown on his head.

S. Enurchus. A dove lighting on his head.

S. Martin. Giving half of his cloak to a beggar.

S. Britius. With a young child in his arms.

S. Cecilia. With her organ.

S. Catherine. With her wheel and a sword.

S. Clement. With an anchor.

S. Nicolas. With three naked children in a tub, in which rests the end of his pastoral staff.

S. Faith. With a bundle of rods. Generally virgins not martyrs hold lamps; if martyrs, roses and lilies; martyrs have palm branches; confessors have lilies; prophets, wheels.

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS.

No.	Square.	Cube.	Square Root.	Cube Root.	No.	Square.	Cube.	Square Root.	Cube Root.
1	1	1	1·0	1·0	41	1681	68921	6·40312	3·4482
2	4	8	1·41421	1·2599	42	1764	74088	6·48074	3·4760
3	9	27	1·73205	1·4423	43	1849	79507	6·55744	3·5034
4	16	64	2·0	1·5874	44	1936	85184	6·63325	3·5303
5	25	125	2·23607	1·7099	45	2025	91125	6·70820	3·5569
6	36	216	2·44949	1·8171	46	2116	97336	6·78230	3·5830
7	49	343	2·64575	1·9129	47	2209	103823	6·85566	3·6088
8	64	512	2·82843	2·0	48	2304	110592	6·92820	3·6342
9	81	729	3·0	2·0801	49	2401	117649	7·0	3·6593
10	100	1000	3·16228	2·1544	50	2500	125000	7·07107	3·6840
11	121	1331	3·31663	2·2239	51	2601	132651	7·14143	3·7084
12	144	1728	3·46410	2·2894	52	2704	140608	7·21110	3·7325
13	169	2197	3·60555	2·3513	53	2809	148877	7·28011	3·7563
14	196	2744	3·74166	2·4101	54	2916	157464	7·34847	3·7798
15	225	3375	3·87298	2·4662	55	3025	166375	7·4162	3·8029
16	256	4096	4·0	2·5198	56	3136	175616	7·48332	3·8259
17	289	4913	4·12311	2·5713	57	3249	185193	7·54983	3·8485
18	324	5832	4·24264	2·6207	58	3364	195112	7·61577	3·8709
19	361	6859	4·35890	2·6684	59	3481	205379	7·68115	3·8930
20	400	8000	4·47214	2·7144	60	3600	216000	7·74597	3·9149
21	441	9261	4·58258	2·7589	61	3721	226981	7·81025	3·9365
22	484	10648	4·69042	2·8020	62	3844	238328	7·87401	3·9579
23	529	12167	4·79583	2·8439	63	3969	250047	7·93725	3·9791
24	576	13824	4·89898	2·8845	64	4096	262144	8·0	4·0
25	625	15625	5·0	2·9240	65	4225	274625	8·06226	4·0207
26	676	17576	5·09902	2·9625	66	4356	287496	8·12404	4·0412
27	729	19683	5·19615	3·0	67	4489	300763	8·18535	4·0615
28	784	21952	5·29150	3·0366	68	4624	314432	8·24621	4·0817
29	841	24389	5·38517	3·0723	69	4761	328509	8·30662	4·1016
30	900	27000	5·47723	3·1072	70	4900	343000	8·36660	4·1213
31	961	29791	5·56776	3·1414	71	5041	357911	8·42615	4·1408
32	1024	32768	5·65685	3·1748	72	5184	373248	8·48528	4·1602
33	1089	35937	5·74456	3·2075	73	5329	389017	8·54400	4·1793
34	1156	39304	5·83095	3·2396	74	5476	405224	8·60233	4·1983
35	1225	42875	5·91608	3·2711	75	5625	421875	8·66025	4·2172
36	1296	46656	6·0	3·3019	76	5776	438976	8·71779	4·2358
37	1369	50653	6·08276	3·3322	77	5929	456533	8·77496	4·2543
38	1444	54872	6·16441	3·3619	78	6084	474552	8·83176	4·2727
39	1521	59319	6·245	3·3912	79	6241	493039	8·88819	4·2908
40	1600	64000	6·32456	3·4199	80	6400	512000	8·944	4·3089

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS—*cont.*

No.	Sqre.	Cube.	Square Root.	Cube Root.	No.	Sqre.	Cube.	Square Root.	Cube Root.
81	6561	531441	9·0	4·3267	121	14641	1771561	11.0	4·9469
82	6724	551368	9·05589	4·3445	122	14884	1815848	11.04536	4·9597
83	6889	571787	9·11043	4·3621	123	15129	1860867	11.09053	4·9732
84	7056	592704	9·16515	4·3795	124	15376	1906624	11·13552	4·9866
85	7225	614125	9·21955	4·3968	125	15625	1953125	11·18034	5·0
86	7396	636056	9·27362	4·4141	126	15876	2000376	11·22497	5·0133
87	7569	658503	9·32738	4·4314	127	16129	2048383	11·26942	5·0265
88	7744	681472	9·38083	4·4479	128	16384	2097152	11·3137	5·0397
89	7921	704969	9·43398	4·4647	129	16641	2146689	11·35781	5·0528
90	8100	729000	9 48683	4·4814	130	16900	2197000	11·4018	5·0652
91	8281	753571	9·53939	4·4979	131	17161	2248091	11·44552	5·0788
92	8464	778688	9·59166	4·5144	132	17424	2299968	11·48912	5·0916
93	8649	804357	9·64365	4·5307	133	17689	2352637	11·53266	5·1045
94	8836	830584	9·69536	4·5468	134	17956	2406104	11·57583	5·1173
95	9025	857375	9·74679	4·5629	135	18225	2460375	11·61895	5·1299
96	9216	884736	9·79796	4·5789	136	18496	2515456	11·6619	5·1426
97	9409	912673	9·84886	4·5947	137	18769	2571353	11·70461	5·1551
98	9604	941192	9·89949	4·6104	138	19044	2628072	11·74734	5·1676
99	9801	970299	9·94987	4·6261	139	19321	2685619	11·78982	5·1801
100	10000	1000000	10·0	4·6416	140	19600	2744000	11·8322	5·1925
101	10201	1030301	10·04988	4·6570	141	19881	2803221	11·87434	5·2048
102	10404	1061208	10·09951	4·6723	142	20164	2863288	11·9164	5·2171
103	10609	1092727	10·14889	4·6875	143	20449	2924207	11·9583	5·2293
104	10816	1124864	10·19804	4·7027	144	20736	2985984	12·0	5·2415
105	11025	1157625	10·24695	4·7177	145	21025	3048625	12·0416	5·2536
106	11236	1191016	10·29563	4·7326	146	21316	3112136	12·08305	5·2656
107	11449	1225043	10·34408	4·7475	147	21609	3176523	12·12486	5·2776
108	11664	1259712	10·39231	4·7622	148	21904	3241792	12·16553	5·2896
109	11881	1295029	10·44031	4·7769	149	22201	3307949	12·20656	5·3015
110	12100	1331000	10·48809	4·7914	150	22500	3375000	12·24745	5·3133
111	12321	1367631	10·53565	4·8059	151	22801	3442951	12·28821	5·3251
112	12544	1404928	10·58301	4·8203	152	23104	3511008	12·32883	5·3368
113	12769	1442897	10·63015	4·8346	153	23409	3581577	12·36932	5·3485
114	12996	1481544	10·67708	4·8488	154	23716	3652264	12·40967	5·3601
115	13225	1520875	10·72381	4·8629	155	24025	3723875	12·44981	5·3717
116	13456	1560896	10·77033	4·877	156	24336	3796416	12·49000	5·3832
117	13689	1601613	10·81665	4·8909	157	24649	3869893	12·52996	5·3947
118	13924	1643032	10·86278	4·9049	158	24964	3944312	12·56981	5·4061
119	14161	1685159	10·90871	4·9187	159	25281	4019679	12·60952	5·4175
120	14400	1728000	10·95445	4·9324	160	25600	4096000	12·64911	5·4288

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS—*cont.*

No.	Sqre.	Cube.	Square Root.	Cube Root.	No.	Sqre.	Cube.	Square Root.	Cube Root.
161	25921	4173281	12·68858	5·4401	201	40401	8120601	14·1775	5·8578
162	26244	4251528	12·72792	5·4514	202	40804	8242408	14·2127	5·8675
163	26569	4330747	12·76715	5·4626	203	41209	8365427	14·2478	5·8771
164	26896	4410944	12·80625	5·4737	204	41616	8489664	14·2829	5·8868
165	27225	4492125	12·84523	5·4848	205	42025	8615125	14·3178	5·8964
166	27556	4574296	12·88410	5·4959	206	42436	8741816	14·3527	5·9059
167	27889	4657463	12·92285	5·5069	207	42849	8869743	14·3875	5·9155
168	28224	4741632	12·96145	5·5178	208	43264	8998912	14·4222	5·9249
169	28561	4826809	13·00000	5·5288	209	43681	9129329	14·4568	5·9345
170	28900	4913000	13·03841	5·5397	210	44100	9261000	14·4914	5·9439
171	29241	5000211	13·07670	5·5505	211	44521	9393931	14·5258	5·9533
172	29584	5088448	13·11488	5·5613	212	44944	9528128	14·5602	5·9627
173	29929	5177717	13·15295	5·5721	213	45369	9663597	14·5945	5·9721
174	30276	5268024	13·19091	5·5828	214	45796	9800344	14·6287	5·9814
175	30625	5359375	13·22876	5·5935	215	46225	9938375	14·6629	5·9907
176	30976	5451776	13·26649	5·6041	216	46656	10077696	14·6969	6·0
177	31329	5545233	13·30414	5·6147	217	47089	10218313	14·7309	6·0092
178	31684	5639752	13·34167	5·6253	218	47524	10360232	14·7648	6·0185
179	32041	5735339	13·37990	5·6358	219	47961	10503459	14·7986	6·0277
180	32400	5832000	13·41641	5·6462	220	48400	10648000	14·8324	6·0368
181	32761	5929741	13·45362	5·6567	221	48841	10793861	14·8661	6·0459
182	33124	6028568	13·49074	5·6671	222	49284	10941048	14·8997	6·0551
183	33489	6128487	13·52775	5·6774	223	49729	11089567	14·9332	6·0641
184	33856	6229504	13·56466	5·6877	224	50176	11239424	14·9666	6·0732
185	34225	6331625	13·60147	5·6980	225	50625	11390625	15·0	6·0822
186	34596	6434856	13·63818	5·7083	226	51076	11543176	15·0333	6·0912
187	34969	6539203	13·67479	5·7185	227	51529	11697083	15·0665	6·1002
188	35344	6644672	13·71131	5·7287	228	51984	11852352	15·0997	6·1091
189	35721	6751269	13·74773	5·7388	229	52441	12008989	15·1327	6·1180
190	36100	6859000	13·78405	5·7489	230	52900	12167000	15·1658	6·1269
191	36481	6967871	13·82028	5·7589	231	53361	12326391	15·1987	6·1358
192	36864	7077888	13·85641	5·7690	232	53824	12487168	15·2315	6·1446
193	37249	7189517	13·89244	5·7790	233	54289	12649337	15·2643	6·1535
194	37636	7301384	13·92839	5·7889	234	54756	12812904	15·2971	6·1622
195	38025	7414875	13·96424	5·7989	235	55225	12977875	15·3297	6·1710
196	38416	7529536	14·000	5·8088	236	55696	13144256	15·3623	6·1797
197	38809	7645373	14·03567	5·8186	237	56169	13312053	15·3949	6·1885
198	39204	7762392	14·07125	5·8285	238	56644	13481272	15·4272	6·1972
199	39601	7880599	14·10674	5·8383	239	57121	13651919	15·4596	6·2058
200	40000	8000000	14·14214	5·8480	240	57600	13824000	15·4919	6·2145

TENACITY OF MATERIALS. (Rankine and others.)

Material.	Dimensions.	Tearing load in lbs.	Length of a lb. weight in feet.	Tenacity in feet of the material.
Cast-steel bar	1 in. × 1 in.	130,000	0·297	38,610
Charcoal iron wire ..	Area, 1 sq. in.	100,000	0·3	30,000
Iron wire rope	Girth, 1·27 in.	4,480	0·6	26,880
Iron bar, strong	1 in. × 1 in.	60,000	0·3	18,000
Boiler-plate, strong ..	Area, 1 sq. in.	50,000	0·3	15,000
Teak wood	1 in. × 1 in.	15,000	3·0	45,000
Deal..	1 in. × 1 in.	12,000	4·0	48,000
Hempen rope, hawser laid	Girth, 1 in.	1,050	26·0	27,300
Ditto, cable laid	Girth, 10 ins.	67,200	0·279	18,750

THICKNESS OF WALLS. (Metropolitan Building Act.)

Thickness for Walls of Dwelling Houses.

The external and party walls of dwelling houses shall be made throughout the different stories of the thickness shown in the following Table, arranged according to the heights and lengths of the walls, and calculated for walls up to 100 feet in height, and supposed to be built of bricks not less than 8½ inches and not more than 9½ inches in length, the heights of the stories being subject to the condition hereinafter given.

Height up to 100 ft.	Length up to 45 ft. — Two stories, 21½ in. Three stories, 17½ in. Remainder, 13 in.	Length up to 80 ft. — Two stories, 26 in. Two stories, 21½ in. Two stories, 17½ in. Remainder, 13 in.	Length unlimited. — One story, 30 in. Two stories, 26 in. Two stories, 21½ in. Two stories, 17½ in. Remainder, 13 in.
Height up to 90 ft.	Length up to 45 ft. — Two stories, 21½ in. Two stories, 17½ in. Remainder, 13 in.	Length up to 70 ft. — One story, 26 in. Two stories, 21½ in. Two stories, 17½ in. Remainder 13 in.	Length unlimited. — One story, 30 in. Two stories, 26 in. One story, 21½ in. Two stories, 17½ in. Remainder, 13 in.
Height up to 80 ft.	Length up to 40 ft. — One story, 21½ in. Two stories, 17½ in. Remainder, 13 in.	Length up to 60 ft. — Two stories, 21½ in. Two stories, 17½ in. Remainder, 13 in.	Length unlimited. — One story, 26 in. Two stories, 21½ in. Two stories, 17½ in. Remainder, 13 in.
Height up to 70 ft.	Length up to 40 ft. — Two stories, 17½ in. Remainder, 13 in.	Length up to 55 ft. — One story, 21½ in. Two stories, 17½ in. Remainder, 13 in.	Length unlimited. — One story, 26 in. Two stories, 21½ in. One story, 17½ in. Remainder, 13 in.
Height up to 60 ft.	Length up to 30 ft. — One story, 17½ in. Remainder, 13 in.	Length up to 50 ft. — Two stories, 17½ in. Remainder, 13 in.	Length unlimited. — One story, 21½ in. Two stories, 17½ in. Remainder, 13 in.
Height up to 50 ft.	Length up to 30 ft. — Wall below the topmost story, 13 in. Topmost story, 8½ in. Remainder, 8½ in.	Length up to 45 ft. — One story, 17½ in. Rest of wall below topmost story, 13in. Topmost story, 8½in. Remainder, 8½ in.	Length unlimited. — One story, 21½ in. One story, 17½ in. Remainder, 13 in.

TABLE—*continued.*

Height up to 40 ft.	Length up to 35 ft. — Wall below two topmost stories, 13 in. Two topmost stories, 8½ in. Remainder, 8½ in.	Length unlimited. — One story, 17½ in. Rest of wall below topmost story, 13 in. Topmost story, 8½ in. Remainder, 8½ in.
Height up to 30 ft.	Length up to 35 ft. — Wall below two topmost stories, 13 in. Two topmost stories, 8½ in. Remainder, 8½ in.	Length unlimited. — Wall below topmost story, 13 in. Topmost story, 8½ in. Remainder, 8½ in.
Height up to 25 ft.	Length up to 30 ft. — From base to top of wall, 8½ in.	Length unlimited. — Wall below topmost story, 13 in. Topmost story, 8½ in. Remainder, 8½ in.

Explanation of Table.

In using the above Table the height of the wall is to be reckoned on the first vertical column on the left hand of the Table, and the length of the wall on the corresponding horizontal column. The thickness of the wall in each story is given in inches, and begins with the wall from the base upwards.

Qualification in case of certain Walls.

If any external or party wall, measured from centre to centre, is not more than 25 feet distant from any other external or party wall to which it is tied by the beams of any floor or floors, other than the ground floor, or the floor of any story formed in the roof, the length of such wall is not to be taken into consideration, and the thickness of the wall will be found in the second vertical column in the above Table.

Condition in respect of Stories exceeding a certain Height.

If any story exceeds in height 16 times the thickness prescribed for the walls of such story in the above Table, the thickness of each external and party wall throughout such

story shall be increased to $\frac{1}{16}$th part of the height of the story; but any such additional thickness may be confined to piers properly distributed, of which the collective widths amount to ¼th part of the length of the wall.

Restriction in case of certain Stories.

No story enclosed with walls less than 13 inches in thickness shall be more than 10 feet in height.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

The thickness of any wall of a dwelling house, if built of materials other than such bricks as aforesaid, shall be deemed to be sufficient if made of the thickness required by the above Table, or of such less thickness as may be approved by the Metropolitan Board, with this exception, that in the case of walls built of stone in which the beds of the masonry are not laid horizontally, no diminution shall be allowed in the thickness required by the foregoing rules for such last-mentioned walls.

BUILDINGS OF THE WAREHOUSE CLASS.

Definition of Warehouse Class.

The warehouse class shall comprise all warehouses, manufactories, breweries, and distilleries.

Thickness at Base.

The external and party walls of buildings of the warehouse class shall at the base be made of the thickness shown in the following Table, calculated for walls up to 100 feet in height, and supposed to be built of bricks not less than 8½ inches and not more than 9½ inches in length.

Height up to 100 ft.	Length up to 55 ft. — Base, 26 in.	Length up to 70 ft. — Base, 30 in.	Length unlimited. — Base, 34 in.
Height up to 90 ft.	Length up to 60 ft. — Base, 26 in.	Length up to 70 ft. — Base, 30 in.	Length unlimited. — Base, 34 in.
Height up to 80 ft.	Length up to 45 ft. — Base, 21½ in.	Length up to 60 ft. — Base, 26 in.	Length unlimited. — Base, 30 in.

TABLE—*continued.*

Height up to 70 ft.	Length up to 30 ft. — Base, 17½ in.	Length up to 45 ft. — Base, 21½ in.	Length unlimited. — Base, 26 in.
Height up to 60 ft.	Length up to 35 ft. — Base, 17½ in.	Length up to 50 ft. — Base, 21½ in.	Length unlimited. — Base, 26 in.
Height up to 50 ft.	Length up to 40 ft. — Base, 17½ in.	Length up to 70 ft. — Base, 21½ in.	Length unlimited. — Base, 26 in.
Height up to 40 ft.	Length up to 30 ft. — Base, 13 in.	Length up to 60 ft. — Base, 17½ in.	Length unlimited. — Base, 21½ in.
Height up to 30 ft.	Length up to 45 ft. — Base, 13 in.	Length unlimited. — Base, 17½ in.	
Height up to 25 ft.	Length unlimited. — Base, 13 in.		

Explanation of Table.

The above Table is to be used in the same manner as the Table previously given for the walls of dwelling houses, and is subject to the same qualifications and conditions respecting walls not more than 25 feet distant from each other.

Thickness at Top of Walls and through Intermediate Space.

The thickness of the walls of buildings of the warehouse class at the top, and for 16 feet below the top, shall be 13 inches; and the intermediate parts of the wall between the base and such 16 feet below the top shall be built solid throughout the space between straight lines drawn on each side of the wall, and joining the thickness at the base to the thickness at 16 feet below the top, as above determined; nevertheless in walls not exceeding 30 feet in height the walls of the topmost story may be 8½ inches thick.

Condition in respect of Stories exceeding a certain Height.

If in any story of a building of the warehouse class the thickness of the wall, as determined by the rules hereinbefore given, is less than $\frac{1}{14}$th part of the height of such story, the thickness of the wall shall be increased to $\frac{1}{14}$th part of the height of the story; but any such additional thickness may be confined to piers properly distributed, of which the collective widths amount to $\frac{1}{4}$th part of the length of the wall.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

The thickness of any wall of a building of the warehouse class, if built of materials other than such bricks as aforesaid, shall be deemed to be sufficient if made of the thickness required by the above Tables, or of such less thickness as may be approved by the Metropolitan Board, with this exception, that in the case of walls built of stone in which the beds of the masonry are not laid horizontally no diminution shall be allowed in the thickness required by the foregoing rules for such last-mentioned walls.

MISCELLANEOUS.

Cross Walls.

The thickness of a cross wall shall be $\frac{2}{3}$rds of the thickness hereinbefore required for an external or party wall of the same dimensions, and belonging to the same class of buildings, but never less than $8\frac{1}{2}$ inches, and no wall subdividing any building shall be deemed to be a cross wall unless it is carried up to $\frac{2}{3}$rds of the height of the external or party walls, and unless the recesses and openings therein do not exceed $\frac{1}{2}$ of the vertical surface of the wall in each story.

Extra Thickness of certain Stone Walls.

The thickness of every stone wall in which the beds of the masonry are not laid horizontally shall be $\frac{1}{3}$rd greater than the thickness prescribed in the rules aforesaid.

Buildings to which the preceding rules are inapplicable require the special sanction of the Metropolitan Board of Works.

TILER.

	Size.	Weight of each.	Weight per 1000.
	in. in. in.	lbs.	cwts.
Plain tiles..	$10\frac{1}{2} \times 6\frac{1}{4} \times \frac{5}{8}$	$2\frac{1}{4}$	$22\frac{1}{4}$
,, ...	$11 \times 7 \times \frac{5}{8}$	$2\frac{9}{10}$	$26\frac{1}{4}$
Pantile	$13\frac{1}{2} \times 9\frac{1}{2} \times \frac{1}{2}$	$5\frac{1}{4}$	47

	Length.	Girth.	Weight per 100 in cwts.
	inches.	inches.	
Ridge tile, plain.. ..	18	14	14
,, rolled top..	18	14	18
,, capped ..	18	14	15
,, pyramid ..	18	14	20

Roofing requires 800 plain tiles per square, laid to 3 inch gauge.
,, 700 ,, ,, ,, $3\frac{1}{2}$,,
,, 600 ,, ,, ,, 4 ,,
,, 180 pantiles ,, ,, 10 ,,
,, 164 ,, ,, ,, 11 ,,
,, 150 ,, ,, ,, 12 ,,

1 square of plain tiling weighs about 15 cwt.
1 ,, pantiling ,, 8 ,,

Plain tiling is laid on fir fillets $1\frac{1}{2}$ in. × 1 in., or on oak laths $1\frac{1}{4}$ in. × $\frac{1}{4}$ in.

100 plain tile laths, 5 ft. long .. .. .. = 1 bundle.
12 pantile laths, $1\frac{1}{2}$ in. × 1 in. × 10 ft. long = 1 ,,

1 square of plain tiling requires { 1 bundle of laths. $1\frac{1}{4}$ hundred of nails. 1 peck of tile-pins. 3 hods of mortar. }

1 ,, pantiling ,, { 1 bundle of laths. $1\frac{1}{4}$ hundred of 6*d*. nails. }

TIMBER. (Britton, &c.)

Density of timber is in proportion to the time in growing.

The lower part of the tree gives the strongest timber.

The heaviest woods are generally the strongest.

The heart is weaker than the exterior parts, and the bark is weaker than the rest.

The greatest strength is generally to be found between the centre and the sap, and timber that is straight in the grain is strongest.

European deals, from 10 to 22 ft. in length and from 8 in. to 10 in. in breadth.

American deals, from 10 to 13 ft. in length and from 9 to 11 in. in breadth.

Slab deals are cut from the outsides of timbers.

Spruce deals are thin deals cut from the white fir trees of Norway.

Yellow deals are generally of a bright yellow colour, and have not lost their resin. In selecting them the brightest should be chosen, and where the strong red grain apparently rises to the surface. Yellow deals are the strongest; they are likewise the dearest.

White fir, known in the English market as "white deal," is seldom imported into this country in logs, but mostly as deals and battens, 2 to 3 in. thick and 5 to 9 in. wide, and are usually cut into lengths of about 12 ft. It unites well with glue, takes stain well, and is capable of taking a high polish. For floors and panels Christiana white deal is considered best.

Timber cut into sizes of various lengths:—

Scantlings 11 in. to 12 in. wide × 3 in. thick are called planks.

Scantlings 9 in. wide × 3 in. thick are called deals.

Scantlings 2 in. to 7 in. wide × 2 in. thick are called battens.

Scantlings $4\frac{1}{2}$ in. wide × 3 in. thick are called battens.

Woods do not alter materially in their length, but in width they contract, warp, and twist.

Timber is permanently injured if more than $\frac{1}{4}$th the breaking weight is placed upon it.

Best Timbers for Various Uses.

General Construction.

Oak.	Fir.	Pine.
Chestnut.	Elm.	Beech.
Teak.	Walnut.	Mahogany.
Cedar.	Larch.	Poplar.

Acacia, spruce fir (scaffolding, ladders, &c.).

Timbers Durable in Wet.

Oak.	Elm.	Beech.
Alder.	White cedar.	Plane.
Teak.	Larch.	Plane (N. American).
Acacia.	Iron bark.	

Timbers Durable in Dry Places.

Oak.	Deal.	Poplar.
Chestnut.	Cedar.	Teak.
Olive.	Pines.	Walnut.
Mahogany.	Maple.	Cedar.
Larch.	Ash.	Sycamore.
Willow.	Plane.	Acacia.

For Patterns.

Deal.	Alder.	Pine.	Mahogany.

Hardest English Woods.

Box.	Elm.	Beech.
Oak.	Walnut.	

WEIGHTS OF TIMBERS. (Rondelet, Tredgold, and others.)

Description.	Weight per cubic foot in lbs.
Ash	52
Beech	53
Birch	42
Box	57
Cedar of Lebanon	35
Chestnut	37
Cork	15
Ebony	63
Elm	42
Fir	31
,, Memel	37
Larch	33
Mahogany, Spanish	66
Oak, English	53
,, American	45
Pine, yellow	26
,, red	40
,, pitch	45
Poplar	24
Sycamore	38
Teak	47
Walnut	41
Yew	47

Timber Measuring.

$G = \frac{1}{4}$th girt of tree at middle in feet.
$g = \frac{1}{4}$th girt of tree at one end in feet.
$g' = \frac{1}{4}$th girt of tree at the other end in feet.
$L =$ Length of log in feet.
$c =$ Cube contents of log in feet.

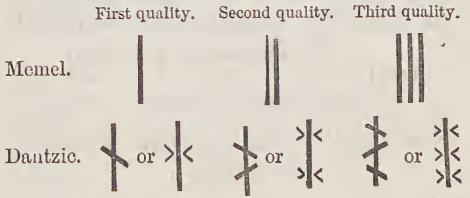
$$c = L\left(\frac{G + g + g'}{3}\right)^2.$$

Allowance is to be made for bark by deducting from each $\frac{1}{4}$th girt. The allowance varies from half an inch in trees with thin bark to 2 inches for trees with thick bark.

Measures of Timber.

100 superficial feet of planking ..	=	1 square.
120 deals	=	1 hundred.
50 cubic feet of squared timber ..	=	1 load.
40 feet of unhewn timber	=	1 load.
600 superficial ft. of inch planking	=	1 load.
Boards 7 inches wide	=	battens.
,, 9 ,, ...	=	deals.
,, 12 ,, ...	=	planks.

Distinguishing Scribe Marks on Timber.



Dantzic.

Crown.	1st Quality.	2nd Quality.	3rd Quality.
S K K	S K	S K I	S K II
M K K	M K	M K I	M K II
O H P K	O H P	O H P I	O H P II
S M	S M	S M	S M
✱ 22×26 K	✱ 22×26 I	✱ 22×26 II	✱ 22×26 $\cancel{II}$

Russian.

S K K R	S K R	S K I R	S K II R

Brand Marks on Deals.

Russian Ports.

Uleaborg, S. Petersburg, and Bjorneborg.

A red	C M B	B S S C	B C
B	N B ii	B U S	
F J F	P B 2		
J I G			
N B I			
P B			

Prussian Port.

Dantzic.

Crown Deck.	Crown Brack Deck.
C C B ♔	C C B
E H E H E H	E H
♔ ♔ J C B	F G F
S K S K S K	J C B J C B J C B
	♔ R J
	S K S K

Swedish Ports.

Gothenburg.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
		A L O	A × O	L × O
		C F W	C × G	× M ×
		D B & C°	× C ×	S S
		H * C°	D D D	

Gothenburg—*continued.*

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
		H S H	E W	
		M	G	
		J C & C°	G A W	
		O * L	J W	
		S R & C°	L * L	
		Skepsta		
		U B	S * F	
		B & C°	U × S	
		♔	W M	
		W A L L	W * S	

Gefle.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
P M	R × C	B B	B L	C × × B
R W ♔ S	R W × S	C ♔ B	C × B	D M
		C V̄ B	C × × B	E * B
		D M	D × A	B × × B
		E I B	D O M	+ M +
		E K B	E I I B	P
		G R A	E × B	S A G
		J ♔ P	H A	W
		K A B	H A B	* * *
		K H	J P	
		K H B	N A S	
		S K B	W × S	

Soderham.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
♔	M × T	C × D	B C	
E S B	S T H	E S B	C	
J F S	V	G C & C°	G G	
M ♔ T		M A R M A	G G G	
W		O O O	M B	
		O W & C°	M M M	
			O W	
			O × W	
			S S T	

Hudiksvall, Norkoping, Sundswall, Stockholm, Lojune, and Mo.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
S ♔ B	S × B	C E	D D D	J E F O
T U N A		F I I K	F & C° 2	O X
		F & C° 1	J E F	

Hudiksvall, Norkoping, Sundswall, Stockholm, Lojune, and Mo—*continued.*

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
		E	K × T	
		J ♛ F	N W	
		J G G G & C°	N X	
		M X	R A R	
		O B & C°	R R R	
		W ♛ R	W W	
		W I R A	W I R A	
		M I X E D	T E R T I A	
		W W B		

Norway.

Christiana.

A × T	A × H	I M	A C	
H H	A H S	H R H	A W	
H P W	B H F	W M E	A W W	
H × W	C × S		B	
L M	F H B		D L D	
M S	F V B		H × H	
N × S	H & S		H T W	
P M A	H y S		M H M	
S I B	H M S		R B	
T I H & S	H S W		S × S	
V E D	L B		T R B	
W F I	P × W			
	R R B			

Drammen.

E × E	A 3 S	A N	A A	K
E ix E	A N 2	T $^{A}_{B}$ B	A × B	
E viii E	B		A 3 B	
viii E	C & C°		A H	
I B	viii E		C C	
J I R	H K & C°		E	
M	I		E E	
	I I		E × E	
	I × E		H	
	I E I		H C	
	I R P		H × H	

Drammen—*continued.*

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
	I 2 S		H K	
	J 2 R		I E	
	K 2 S		I I	
	K W		I I R	
	M × N		I W	
	N ii		J I I	
	N J		J 3 R	
	N M		K 3 S	
	S — C		L L	
	T * M		L — L	
	T × T		N A M	
	X X		N B	
			N iii B	
			N xxx	
			P	
			R iii	
			S C	
			S × C	
			T B	
			T M	
			T T	
			W D	
			*	

Fredericstadt.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
A K° C°	A K C°	A T & C°	C × S	H B
H * B	B × B	F S M	F S C	
J B	K × K		G	
J N J	M M		H B T	
S F A	S F B		S W S	
W B	W W			
W G				
W I E L & C°				
W I E S				

Marks on Planks, Deals, and Battens.

With few exceptions the following general rules apply:

Goods from Swedish ports are stencilled with *red* letters or marks on the ends.

Goods from Russian and Finland ports are what is termed "hammer branded" or "dry stamped" on the ends, *i. e.* they are indented with small uncoloured letters about one inch long. The numbers which occur in some in Arabic figures do not denote quality, but the number of yard of the exporter.

Norway goods are mostly stencilled with blue letters; Canada goods with black letters, and white letters on ends, and red quality or sorting marks on edges near ends.

Any quantity of deals, planks, or battens equivalent in cubical contents to No. 120 11 in. × $1\frac{1}{2}$ in. is a Standard 100 or Petersburg Standard, but they are often dealt in by what is known as London Standard 100, equivalent to No. 120, 9 in. × 3 in.

Builders' "yellow" deals are in timber merchants' phrase red deals.

In baulk timber the merchants' "first" quality or "crown" is picked for straightness of grain and freedom from knots only; it is frequently very sappy: a considerable portion of it cuts up badly, and it is subject to heart shakes, whilst its very straightness and softness render it not so well adapted to carry heavy weights as the second quality or best middling.

Table of the Transverse Strength of Timber, 1 inch square, 1 foot long.

Name.	Specific Gravity.	Barlow. Value of S.*	Tredgold. Value of S.*
		lbs.	lbs.
Ash, English	·760	675	656
Beech "	·696	519	677
Birch, common	·711	607	—
Elm, English	·579	338	540
" American	—	611	—
Oak, English	·829	400	710
" "	—	470	400
" Adriatic	—	461	448
" Canadian	—	588	—
" Dantzic	·720	486	—
" Riga	—	—	714
Pine, American, red	·576	447	—
" " yellow ..	·508	—	658
" pitch	·740	544	560
" Memel	·601	577	545
" Riga	·654	376	530
Fir, spruce, American ..	·772	—	570
" Mar Forest	·698	408	315
" Scotch	—	—	582
" New England	—	367	—
Deal, Christiania..	·689	521	686
Larch	·505	280	557
Walnut	—	—	500
Spanish Chestnut	—	—	610
Mahogany, Honduras ..	—	—	637
" Spanish	—	—	425
Teak	·729	820	717
Poon	—	740	590

* Value of S is the value in lbs. of S used in the formulæ for calculating the strength of girders.

TRIANGLES AND ANGLES.

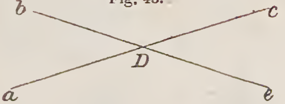
A right angle = 90°.

An obtuse angle is an angle of more than 90°.

An acute angle is less than 90°.

If two straight lines cut one another, the vertical or opposite angles are equal. (Euclid, Bk. I., prop. 15.)

Fig. 43.



Thus the angle $a\,D\,b$ is equal to the angle $c\,D\,e$, and the angle $a\,D\,e$ to the angle $b\,D\,c$.

And as the angles which one straight line makes with another upon one side of it are together equal to two right angles (Euclid, Bk. I., prop. 13), if any of the angles in the above figure be known, the others are known.

Example.—If angle $a\,D\,b$ is 25°, then the angle $b\,D\,c$ is $180° - 25° = 155°$.

The three interior angles of every triangle are together equal to two right angles (Euclid, Bk. I., prop. 32), so that if two angles of a triangle are known, the remaining angle is the difference between the sum of the two and 180°.

Fig. 44.

Example.—If in the triangle $a\,b\,c$ the angle $c\,a\,b$ is 30° and the angle $a\,b\,c$ 35°, then the angle $b\,c\,a$ is $180 - (30 + 35) = 65 = 115°$.

The greater side of every triangle is opposite

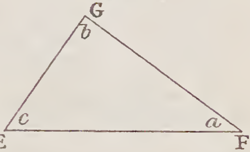
to the greater angle (Euclid, Bk. I., prop. 18); and conversely the greater angle of every triangle is opposite to the greater side.

Given the line E F and the angles c and a to find the side E G.

Find the angle $b = 180° - (c + a)$, then

$$\text{E G} = \text{E F}\,\frac{\sin. a}{\sin. b};$$

Fig. 45.



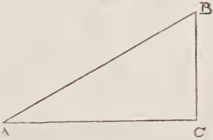
if the angle be more than 90°,

$$\text{E G} = \text{E F}\,\frac{\sin. (180° - a)}{\sin. b}.$$

Right-angled Triangles.

Let
A B = Hypothenuse.
A C = Base.
B C = Perpendicular.
And A, B, and C the respective angles.

Fig. 46.



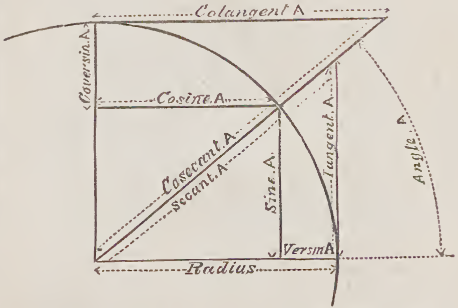
$$\text{Hypoth.} = \sqrt{\text{Base}^2 + \text{Perp.}^2}$$

$$\text{Base} = \sqrt{(\text{Hyp.} + \text{Perp.}) \times (\text{Hyp.} - \text{Perp.})}$$

$$\text{Perp.} = \sqrt{(\text{Hyp.} + \text{Base}) \times (\text{Hyp.} - \text{Base})}$$

TRIGONOMETRICAL EXPRESSIONS.

The diagram shows the different trigonometrical expressions in terms of the angle A.



Complement of an angle = its difference from 90
Supplement " " = " " 180

VALUATION OF PROPERTY.

Leasehold Property.

1st and 2nd	class,	from	15 to 16	years' purchase,	or	6	per cent.
2nd and 3rd	"	"	14 to 15	"	"	7	"
3rd and 4th	"	"	12 to 13	"	"	8	"
4th and 5th	"	"	11 to 12	"	"	9	"
5th and 6th	"	"	10	"	"	10	"

Freehold land in the county, 30 to 33 years' purchase.

TABLE FOR PURCHASING LEASES OR OTHER ESTATES HELD FOR FIXED TERMS OF YEARS; OR THE PRESENT VALUE OF £1 PER ANNUM FOR ANY NUMBER OF YEARS.

The calculations show the interest a purchaser may make of his money and get back his capital during the term, provided he can reinvest at the same rate of interest.

Years.	Years' Purchase.							
	3 p. c.	4 p. c.	5 p. c.	6 p. c.	7 p. c.	8 p. c.	9 p. c.	10 p. c.
1	0·97	0·96	0·95	0·94	0·94	0·93	0·92	0·91
2	1·91	1·89	1·86	1·83	1·81	1·78	1·76	1·74
3	2·83	2·78	2·72	2·67	2·62	2·58	2·53	2·49
4	3·72	3·63	3·55	3·47	3·39	3·31	3·24	3·17
5	4·58	4·45	4·33	4·21	4·10	3·99	3·89	3·79
6	5·42	5·24	5·08	4·92	4·77	4·62	4·49	4·36
7	6·23	6·00	5·79	5·58	5·39	5·21	5·03	4·87
8	7·02	6·73	6·46	6·21	5·97	5·75	5·54	5·34
9	7·79	7·44	7·11	6·80	6·52	6·25	6·00	5·76
10	8·53	8·11	7·72	7·36	7·02	6·71	6·42	6·15
11	9·25	8·76	8·31	7·89	7·50	7·14	6·81	6·50
12	9·95	9·39	8·86	8·38	7·94	7·54	7·16	6·81
13	10·64	9·99	9·39	8·85	8·36	7·90	7·49	7·10
14	11·30	10·56	9·90	9·30	8·75	8·24	7·79	7·37
15	11·94	11·12	10·38	9·71	9·11	8·56	8·06	7·61
16	12·56	11·65	10·84	10·11	9·45	8·85	8·31	7·82
17	13·17	12·17	11·27	10·48	9·76	9·12	8·54	8·02
18	13·75	12·66	11·69	10·83	10·06	9·37	8·76	8·20
19	14·32	13·13	12·09	11·16	10·34	9·60	8·95	8·37
20	14·88	13·59	12·46	11·47	10·59	9·82	9·13	8·51
21	15·42	14·03	12·82	11·76	10·84	10·02	9·29	8·65
22	15·94	14·45	13·16	12·04	11·06	10·20	9·44	8·77
23	16·44	14·86	13·49	12·30	11·27	10·37	9·58	8·88
24	16·94	15·25	13·80	12·55	11·47	10·53	9·71	8·99
25	17·41	15·62	14·09	12·78	11·65	10·68	9·82	9·08
26	17·88	15·98	14·38	13·00	11·83	10·81	9·93	9·16
27	18·33	16·33	14·64	13·21	11·99	10·94	10·03	9·24
28	18·76	16·66	14·90	13·41	12·14	11·05	10·12	9·31
29	19·19	16·98	15·14	13·59	12·28	11·16	10·20	9·37

TABLE FOR PURCHASING LEASES—*continued.*

Years.	Years' Purchase.							
	3 p. c.	4 p. c.	5 p. c.	6 p. c.	7 p. c.	8 p. c.	9 p. c.	10 p. c.
30	19·60	17·29	15·37	13·77	12·41	11·26	10·27	9·43
31	20·00	17·59	15·59	13·93	12·53	11·35	10·34	9·48
32	20·39	17·87	15·80	14·08	12·65	11·44	10·41	9·53
33	20·77	18·15	16·00	14·23	12·75	11·51	10·46	9·57
34	21·13	18·41	16·19	14·37	12·85	11·59	10·52	9·61
35	21·49	18·67	16·37	14·50	12·95	11·66	10·57	9·64
36	21·83	18·91	16·55	14·62	13·04	11·72	10·61	9·68
37	22·17	19·14	16·71	14·74	13·12	11·78	10·65	9·71
38	22·49	19·37	16·87	14·85	13·19	11·83	10·69	9·73
39	22·81	19·58	17·02	14·95	13·26	11·88	10·73	9·76
40	23·12	19·79	17·16	15·05	13·33	11·93	10·76	9·78
41	23·41	19·99	17·29	15·14	13·39	11·97	10·79	9·80
42	23·70	20·19	17·42	15·23	13·45	12·01	10·81	9·82
43	23·98	20·37	17·55	15·31	13·51	12·04	10·84	9·83
44	24·25	20·55	17·66	15·38	13·56	12·08	10·86	9·85
45	24·52	20·72	17·77	15·46	13·61	12·11	10·88	9·86
46	24·78	20·89	17·88	15·52	13·65	12·14	10·90	9·88
47	25·03	21·04	17·98	15·59	13·69	12·16	10·92	9·89
48	25·27	21·20	18·08	15·65	13·73	12·19	10·93	9·90
49	25·50	21·34	18·17	15·71	13·77	12·21	10·95	9·91
50	25·73	21·48	18·26	15·76	13·80	12·23	10·96	9·92
55	26·77	22·11	18·63	15·99	13·94	12·32	11·01	9·95
60	27·68	22·62	18·93	16·16	14·04	12·38	11·05	9·97
65	28·45	23·05	19·16	16·29	14·10	12·42	11·07	9·98
70	29·12	23·40	19·34	16·39	14·16	12·44	11·08	9·99
75	29·70	23·68	19·49	16·46	14·20	12·46	11·09	9·99
80	30·20	23·92	19·60	16·51	14·22	12·47	11·10	10·00
85	30·63	24·11	19·68	16·55	14·24	12·48	11·11	10·00
90	31·00	24·27	19·75	16·58	14·25	12·49	11·11	10·00
95	31·32	24·40	19·81	16·60	14·26	12·49	11·11	10·00
100	31·60	24·51	19·85	16·62	14·27	12·49	11·11	10·00
Perp.	33·33	25·00	20·00	16·67	14·29	12·50	11·11	10·00

Thus, £50 per annum for 35 years, at 6 per cent. is worth 14½ years' purchase, or £725.

Tables for Estimating the Value of the Reversion in Fee in Purchasing Ground Rents.

After these Years.	Years' Purchase 5 per cent.	Years' Purchase 6 per cent.	Years' Purchase 7 per cent.	Years' Purchase 8 per cent.	Years' Purchase 9 per cent.	Years' Purchase 10 p. cent.
1	19	15¾	13¼	11½	10¼	9
2	18¼	14¾	12½	10¾	9¼	8¼
3	17¼	14	11¾	10	8½	7½
4	16½	13¼	10¾	9¼	7¾	6¾
5	15¾	12½	10¼	8½	7¼	6¼
6	15	11¾	9½	7¾	6¾	5¾
7	14¼	11	9	7¼	6	5¼
8	13½	10½	8¼	6¾	5½	4¾
9	13	9¾	7¾	6¼	5	4¼
10	12¼	9¼	7¼	5¾	4¾	3¾
11	11¾	8¾	6¾	5¼	4¼	3½
12	11¼	8¼	6¼	5	4	3¼
13	10½	7¾	6	4½	3½	3
14	10	7¼	5½	4¼	3¼	2¾
15	9½	7	5¼	4	3	2½
17	9¼	6½	4¾	3¾	2¾	2¼
17	8¾	6¼	4½	3½	2½	2
18	8¼	5¾	4¼	3¼	2¼	1¾
19	8	5½	4	3	2¼	1¾
20	7½	5¼	3¾	2¾	2	1½
21	7¼	5	3½	2½	1¾	1¼
22	6¾	4¾	3¼	2¼	1¾	1¼
23	6½	4½	3	2¼	1½	1
24	6¼	4	2¾	2	1½	1
25	6	3¾	2¾	1¾	1¼	1
26	5¾	3¾	2½	1¾	1¼	¾
27	5¼	3½	2¼	1½	1	¾
28	5	3¼	2¼	1½	1	¾
29	4¾	3	2	1¼	1	¾
30	4¾	3	2	1¼	¾	½
31	4½	2¾	1¾	1¼	¾	½
32	4¼	2½	1¾	1	¾	½
33	4	2½	1½	1	¾	½
34	3¾	2¼	1½	1	½	⅓
35	3¾	2¼	1¼	¾	½	⅓

Tables of Reversion in Fee—*continued.*

After these Years.	Years' Purchase 5 per cent.	Years' Purchase 6 per cent.	Years' Purchase 7 per cent.	Years' Purchase 8 per cent.	Years' Purchase 9 per cent.	Years' Purchase 10 p. cent.
36	3½	2	1¼	¾	½	1/3
37	3¼	2	1¼	¾	½	¼
38	3¼	1¾	1	¾	½	¼
39	3	1¾	1	½	½	¼
40	2¾	1½	1	½	½	¼
41	2¾	1½	1	½	1/3	1/5
42	2½	1½	¾	½	¼	1/6
43	2½	1¼	¾	½	¼	1/6
44	2¼	1¼	¾	½	¼	1/6
45	2¼	1¼	¾	½	¼	1/7
46	2	1¼	¾	1/3	1/5	1/8
47	2	1	½	1/3	1/5	1/9
48	2	1	½	1/3	1/6	1/10
49	1¾	1	½	¼	1/6	1/10
50	1¾	1	½	¼	1/6	1/12
51	1¾	¾	½	¼	1/7	1/12
52	1½	¾	½	¼	1/8	1/16
53	1½	¾	½	1/5	1/9	1/16
54	1½	¾	1/3	1/5	1/9	1/16
55	1¼	¾	1/3	1/6	1/10	1/20
56	1¼	¾	1/3	1/6	1/12	1/20
57	1¼	½	1/3	1/6	1/12	1/24
58	1¼	½	¼	1/7	1/12	1/24
59	1	½	¼	1/7	1/16	1/30
60	1	½	¼	1/8	1/16	1/30
61	1	½	¼	1/8	1/16	1/32
62	1	5/12	1/5	1/10	1/20	1/36
63	11/12	5/12	1/5	1/10	1/20	1/40
64	7/8	4/10	3/16	1/10	1/20	1/44
65	4/5	3/8	1/6	1/12	1/23	1/48
66	4/5	3/8	1/6	1/12	1/25	1/51
67	¾	1/3	1/6	1/16	1/27	1/56
68	¾	1/3	1/8	1/16	1/30	1/64
69	2/3	3/10	1/8	1/16	1/33	1/68
70	2/3	¼	1/8	1/16	1/36	1/74
71	5/8	¼	1/8	1/20	1/40	1/80
72	3/5	¼	1/10	1/20	1/44	1/87

TABLE OF REVERSION IN FEE—*continued.*

After these Years.	Years' Purchase 5 per cent.	Years' Purchase 6 per cent,	Years' Purchase 7 per cent.	Years' Purchase 8 per cent.	Years' Purchase 9 per cent.	Years' Purchase 10 p. cent.
73	$\frac{7}{12}$	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{20}$	$\frac{1}{46}$	$\frac{1}{96}$
74	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{10}$	$\frac{1}{24}$	$\frac{1}{51}$	$\frac{1}{106}$
75	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{12}$	$\frac{1}{24}$	$\frac{1}{56}$	$\frac{1}{120}$
76	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{12}$	$\frac{1}{30}$	$\frac{1}{60}$	$\frac{1}{137}$
77	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{1}{12}$	$\frac{1}{30}$	$\frac{1}{64}$	$\frac{1}{137}$
78	$\frac{5}{12}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{1}{30}$	$\frac{1}{74}$	$\frac{1}{160}$
79	$\frac{5}{12}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{1}{30}$	$\frac{1}{80}$	$\frac{1}{192}$
80	$\frac{4}{10}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{1}{40}$	$\frac{1}{87}$	$\frac{1}{192}$
81	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{1}{40}$	$\frac{1}{96}$	$\frac{1}{240}$
82	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{20}$	$\frac{1}{40}$	$\frac{1}{106}$	$\frac{1}{240}$
83	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{20}$	$\frac{1}{48}$	$\frac{1}{106}$	$\frac{1}{240}$
84	$\frac{1}{3}$	$\frac{1}{8}$	$\frac{1}{20}$	$\frac{1}{48}$	$\frac{1}{120}$	$\frac{1}{320}$
85	$\frac{1}{3}$	$\frac{1}{8}$	$\frac{1}{20}$	$\frac{1}{48}$	$\frac{1}{137}$	$\frac{1}{320}$
86	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{1}{24}$	$\frac{1}{60}$	$\frac{1}{137}$	$\frac{1}{320}$
87	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{24}$	$\frac{1}{60}$	$\frac{1}{160}$	$\frac{1}{320}$
88	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{28}$	$\frac{1}{80}$	$\frac{1}{160}$	$\frac{1}{480}$
89	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{30}$	$\frac{1}{80}$	$\frac{1}{192}$	$\frac{1}{480}$
90	$\frac{1}{4}$	$\frac{1}{12}$	$\frac{1}{30}$	$\frac{1}{80}$	$\frac{1}{192}$	$\frac{1}{480}$

COST OF BUILDINGS.

Taken per inmate, the following buildings cost:—West London Workhouse, Holloway, £48; St. Pancras Infirmary, Highgate, £68; Chorlton Union Hospital, under £50; and, taking one pavilion, St. Thomas's Hospital, £250; Devon Pauper Lunatic Asylum, £115, and Hanwell Asylum, £162; Pentonville Prison also £162.

At per foot cube, the expense of erection was:—Houses of Parliament, 2*s.* 6*d.*; British Museum, 1*s.* 6*d.*; Foreign Office, 1*s.* 0¾*d.*; Royal Exchange, 11*d.*; Colonial Chambers, Fenchurch Street, 10*d.*; St. Thomas's Hospital, 9*d.*; Manchester Assize Courts, 9½*d.*; Birmingham Exchange and Offices, 6*d.*

Table of Calculations for Purchasing Building Land according to the Lancashire System.

					At Years' Purchase.								
					20			21			22		
	£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
¼d. per yard per ann. is	5	0	10	per acre per ann., which is	100	16	8	105	17	6	110	18	4
½ ,, ,,	10	1	8	,, ,, ,,	201	13	4	211	15	0	221	16	8
¾ ,, ,,	15	2	6	,, ,, ,,	302	10	0	317	12	6	332	15	0
1 ,, ,,	20	3	4	,, ,, ,,	403	6	8	423	10	0	443	13	4
2 ,, ,,	40	6	8	,, ,, ,,	806	13	4	847	0	0	887	6	8
3 ,, ,,	60	10	0	,, ,, ,,	1210	0	0	1270	10	0	1331	0	0
4 ,, ,,	80	13	4	,, ,, ,,	1613	6	8	1694	0	0	1774	13	4
5 ,, ,,	100	16	8	,, ,, ,,	2016	13	4	2117	10	0	2218	6	8
6 ,, ,,	121	0	0	,, ,, ,,	2420	0	0	2541	0	0	2662	0	0
1s. ,, ,,	242	0	0	,, ,, ,,	4840	0	0	5082	0	0	5334	0	0

					23			24			25		
	£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
¼d. per yard per ann. is	5	0	10	per acre per ann., which is	115	19	2	121	0	0	126	0	10
½ ,, ,,	10	1	8	,, ,, ,,	231	18	4	242	0	0	252	1	8
¾ ,, ,,	15	2	6	,, ,, ,,	347	17	6	363	0	0	378	2	6
1 ,, ,,	20	3	4	,, ,, ,,	463	16	8	484	0	0	504	3	4
2 ,, ,,	40	6	8	,, ,, ,,	927	13	4	968	0	0	1008	6	8
3 ,, ,,	60	10	0	,, ,, ,,	1391	10	0	1452	0	0	1512	10	0
4 ,, ,,	80	13	4	,, ,, ,,	1855	6	8	1936	0	0	2016	13	4
5 ,, ,,	100	16	8	,, ,, ,,	2319	3	4	2420	0	0	2520	16	8
6 ,, ,,	121	0	0	,, ,, ,,	2783	0	0	2904	0	0	3025	0	0
1s. ,, ,,	242	0	0	,, ,, ,,	5566	0	0	5808	0	0	6050	0	0

VELOCITY OF SOUND.

32° Fahr.	velocity,	1092 ft.	per second.
62° „	„	1125	„
90° „	„	1155	„

VENTILATION.

Each person requires at least from 3 to 4 cubic feet of air per minute.

Ordinary windows allow about 8 cubic feet of air to pass per minute.

Sleeping rooms require 1000 cubic feet of space to each person.

VENTILATION OF ROOMS, &c.

Tredgold's rule is, "Multiply the number of people the room is to contain by 4, and divide this product by 43 times the square root of the height of the tubes in feet, and the quotient is the area of the ventilation tube or tubes in feet." The following Table from Mr. Hood's work shows the quantity of air in cubic feet discharged per minute through a ventilator of which the area is a square foot.

Height of Ventilator in Feet.	Difference between Temperature in Room and External Air.					
	5°	10°	15°	20°	25°	30°
10	116	164	200	235	260	284
15	142	202	245	284	318	324
20	164	232	285	330	368	404
25	184	260	318	368	410	450
30	201	284	347	403	450	493
35	218	306	376	436	486	531
40	235	329	403	465	518	570
45	248	348	427	493	551	605
50	260	367	450	518	579	635

VENTILATION OF DRAINS.

A simple method is to continue the soil pipe upwards from the drain pipe to a height of 4 or 5 feet above the eaves, and terminating with an open top, taking care to keep the ventilating pipe away from windows and chimneys. The soil pipes from the water-closets should be short branches into this pipe, each water-closet being trapped.

WARMING BY STEAM. (Molesworth.)

When the external temperature is 10° below freezing point, in order to maintain a temperature of 60° :—

One superficial foot of steam-pipe for each 6 superficial feet of glass in the windows.

One superficial foot of ditto for every 6 cube of air escaping for ventilation per minute.

One superficial foot of ditto for every 120 feet of wall, roof, or ceiling.

One cube foot of boiler is required for every 2000 cube feet of space to be heated.

One horse-power boiler is sufficient for 50,000 cube feet of space.

Steam should be about 112°.

WARMING BY HOT WATER.

P = Temperature of pipes.

T = Temperature required in building.

t = Temperature of external air.

C = Cube feet of air to be warmed per minute.

L = Length of pipe in feet.

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot 0045\ C. \text{ for 4-in. pipe}$$

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot 006 \quad \text{,,} \quad \text{3-in.} \quad \text{,,}$$

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot 009 \quad \text{,,} \quad \text{2-in.} \quad \text{,,}$$

WATER.

1 gallon of water = 0·16 cubic foot (approximately).

1 cubic foot of water = $6\frac{1}{4}$ gallons (approximately).

1 cwt. of water = 1·8 cubic foot.

1 ton of water = 36 cubic feet (nearly).

224 gallons of water = 1 ton.

Sea Water.

1 cubic foot of sea water = $64\frac{1}{10}$ lbs.

Weight of sea water = 1·027 weight of fresh water.

Water expands in freezing $\frac{1}{12}$th part of its bulk.

WATER SUPPLY.

Provide 16 to 20 gallons per head per day in non-manufacturing towns.

Provide 20 to 30 gallons per head per day in manufacturing towns.

Service tanks should contain three days' supply.

Impounding reservoirs should contain from 120 to 200 days' supply.

WATERWORKS.

Rules for Water Supply. (Rawlinson.)

1. Water supply may be gravitating, or the water may be pumped by steam power.

2. As a rule, gravitating works require the largest outlay.

3. The annual working expenses of a pumping scheme will frequently be greatest.

4. No puddle wall to be less in width at the top water-line, in any part of the embankment, than 8 feet, and to increase for each foot of vertical height not less than 1 inch in width on each side of such puddle wall down to the ground-line at the deepest part of the embankment. The puddle trench to be filled entirely with puddle.

5. The inner slope to an embankment should not be less than 3 horizontal to 1 vertical. The outer slope should not be less than $2\frac{1}{2}$ horizontal to 1 vertical.

6. Embankments should be formed in layers of earth not more than 12 inches deep, spread evenly over the entire area of such embankment.

7. The finished top bank width of any reservoir should not be less than the following dimensions, namely:—

An embankment 25 ft. deep, not less than 6 ft. wide.

An embankment 50 ft. deep, not less than 12 ft. wide.

An embankment 75 ft. deep, not less than 18 ft. wide.

Intermediate, or lesser, or greater depths of

embankment may have proportionately arranged widths.

8. The finished top bank level of any reservoir not to be at less than the following elevations above the edge of the by-wash or top water-line of a full reservoir, namely:—

An embankment	25 ft.	deep,	not less than	4 ft.
"	50	"	"	5 "
"	75	"	"	6 "

9. Intermediate, or lesser, or greater depths of embankment may have proportionately arranged relative top bank and by-wash levels.

10. Each impounding reservoir to have full and free by-wash space not less than 3 feet in length for every hundred acres of gathering-ground; such by-wash, where practicable, to be formed in the solid ground.

11. Cast-iron pipes, culverts of timber or other material liable to decay, should not be used for outlet discharge, or for overflow works, if required to be buried.

12. Valves and sluices should be placed within the line of puddle wall.

13. A reservoir embankment should at all times be preserved at its full height, and the relative level of the top bank and by-wash be preserved.

14. Reservoirs for service distribution should be covered. Water should not be exposed in open reservoirs and tanks after filtration.

15. Cast-iron pipes, properly varnished, should be used for street mains. It is not advisable to use mains less in internal diameter than 3 inches.

16. Lead should not be used either in service pipes or in house cisterns. Wrought-iron tubes with screw joints may be used for house service. All house taps should have screw joints, and be of the description known as screw-down, so as to admit of easy repairs.

17. In jointing and fixing wrought-iron service pipes care should be taken to insert double screw joints at convenient points, to allow the removal of a length of pipe for alterations and repairs.

18. Up-bends should be avoided, or a tap should be inserted to allow any accumulation of air to escape.

19. Wrought-iron service pipes are cheaper, stronger, and more easily fitted than service pipes of lead. Certain sorts of made ground in towns act rapidly and injuriously on both lead and iron pipes,—furnace ashes, waste gas, and chemical refuse, old building refuse containing lime, and other such material. Pipes should not be laid in such material without a lining of sand or puddle, or other special protection.

20. Earthenware pipes may be used for water conduits, provided the joints are not placed under pressure.

A public supply of water should not be less in volume than 20 gallons daily per head of the population. This in towns below 20,000 population will include water for public purposes and for trade requirements.

21. High pressure and constant service should be secured wherever practicable.

22. Water at and below six degrees of hardness is "soft" water; above this range water is "hard."

23. Hardness in water implies one grain of bicarbonate or sulphate of lime in each gallon of water.

Each degree of hardness destroys $2\frac{1}{2}$ oz. of soap in each 100 gallons of water used for washing. Soft water is therefore, commercially, of more value than hard water in proportion to the worth of 5 oz. of soap to each 200 gallons for each degree of hardness. But soft water is also more wholesome, and effects saving in other operations—tea-making, and in generating steam power.

WATER PIPES. (Molesworth.)

To bear a pressure of 200 feet of water or proof of 400 feet.

Bore in Inches.	Thickness of Metal.	Depth of Socket.	Thickness of Socket.	Space for Packing.	Weight of 9-feet Length.*			Weight of Lead Joint.
	inches.	inches.	inches.	inches.	cwt.	qrs.	lbs.	lbs.
3	$\frac{5}{16}$	3	$\frac{5}{8}$	$\frac{1}{4}$	0	3	24	2·4
4	$\frac{5}{16}$	3	$\frac{5}{8}$	$\frac{1}{4}$	1	1	14	3·6
5	$\frac{3}{8}$	$3\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{8}$	1	2	16	6·0
6	$\frac{3}{8}$	$3\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{8}$	2	0	0	8·2
7	$\frac{3}{8}$	$3\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{8}$	2	1	4	8·7
8	$\frac{7}{16}$	$3\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{8}$	3	0	4	9·9
9	$\frac{7}{16}$	4	$\frac{3}{4}$	$\frac{3}{8}$	3	1	19	13·9
10	$\frac{1}{2}$	4	$\frac{3}{4}$	$\frac{3}{8}$	4	1	16	14·9
11	$\frac{1}{2}$	4	$\frac{3}{4}$	$\frac{3}{8}$	4	2	22	15·9
12	$\frac{9}{16}$	4	$\frac{7}{8}$	$\frac{3}{8}$	5	2	24	17·2
14	$\frac{5}{8}$	4	$\frac{7}{8}$	$\frac{3}{8}$	7	2	4	20·8

* The 9-feet length is taken from the end of one pipe to the end of the next when laid.

Cast-iron Pipes—Pressure in.

Let H = Head of water in feet.
P = Pressure of water in lbs. per square inch.
d = Internal diameter of pipe in inches.
t = Thickness of metal in inches.

$P = 0\cdot433\,H.$

$t = 0\cdot000054\,H\,d + x.$

or $t = \cdot000125\,P.d + x.$

$x = \cdot37$ in. for pipes less than 12 in. diam.
$= \cdot5$ for pipes from 12 to 30 inches.
$= \cdot6$ for pipes from 30 to 50 in. diameter.

Delivery of Water in Pipes. (Eytelwein.)

D = Diameter of pipe in inches.
H = Head of water in feet.
L = Length of pipe in feet.
W = Cubic feet of water discharged per minute.

$$W = 4\cdot72\sqrt{\frac{D^5\,H}{L}}. \qquad D = 538\sqrt[5]{\frac{L\,W^2}{H}}.$$

Hawksley's Formula for the Delivery of Water in Pipes.

G = Number of gallons delivered per hour.
L = Length of pipe in yards.
H = Head of water in feet.
D = Diameter of pipe in inches.

$$D = \tfrac{1}{15}\sqrt[5]{\frac{G^2\,L}{H}}. \qquad G = \sqrt{\frac{15\,D)^5\,H}{L}}.$$

WELLS.

TABLE SHOWING QUANTITY OF BRICKS AND DIGGING IN WELLS AND CYLINDRICAL SEWERS FOR EACH FOOT IN DEPTH OR LENGTH.

Diameter in the Clear.	HALF BRICK RUN.				ONE BRICK RUN.			
	Cubic Feet of Digging.	Number of Bricks.		Cubic Feet of Brickwork.	Cubic Feet of Digging.	Number of Bricks.		Cubic Feet of Brickwork.
		Laid Dry.	In Mortar.			Laid Dry.	In Mortar.	
1·0	$2\frac{1}{2}$	28	24	1·6	$4\frac{1}{9}$	75	60	4·2
1·6	4	42	34	2·3	7	100	84	5·5
2·0	6	50	42	2·8	10	125	100	6·5
2·6	$8\frac{1}{2}$	60	50	3·4	$12\frac{3}{4}$	142	118	7·8
3·0	11	70	58	4·0	$15\frac{1}{6}$	164	136	9·0
3·6	$14\frac{1}{5}$	80	66	4·6	20	182	150	10·1
4·0	18	89	74	5·2	24	200	164	11·2
4·6	$21\frac{4}{5}$	100	82	5·8	$28\frac{1}{3}$	214	180	12·4
5·0	26	110	90	6·4	$33\frac{1}{5}$	240	198	13·6
6·0	36	130	106	7·6	$44\frac{1}{5}$	278	230	16·0
7·0	$47\frac{1}{5}$	150	122	8·7	57	318	264	18·3
8·0	$60\frac{1}{10}$	170	140	9·9	$70\frac{1}{10}$	358	295	20·7
9·0	$74\frac{4}{5}$	190	155	11·0	$86\frac{2}{3}$	396	328	23·0
10·0	$90\frac{9}{10}$	218	172	12·2	$103\frac{1}{10}$	435	360	25·4

WEIGHT OF METALS.

Wrought Iron.

Cubic inches × ·28 = lbs. avoirdupois.
,, ÷ 100 = qrs.
,, ÷ 400 = cwts.
Thickness of plates in inches × 40 = lbs. per sq. ft.
,, ,, eighths × 5 = ,, ,,
,, ,, tenths × 4 = ,, ,,
Sectional area in inches × 3·34 = lbs. per lin. ft.
,, ,, eighths × ·052 = ,, ,,
,, ,, inches × 10 = lbs. per lin. yd.
Lbs. per lineal yard × ·7857 = tons per mile run.
Diameter of round iron in inches squared × 2·64 = lbs. per foot run.

Various Metals.

Multipliers to convert the weights as found above into the weights of other metals.

Weight of wrought iron	× ·92	=	weight of	zinc.
,, ,, ,,	× ·93	=	,,	cast iron.
,, ,, ,,	× ·94	=	,,	tin.
,, ,, ,,	× 1·02	=	,,	steel.
,, ,, ,,	× 1·09	=	,,	brass.
,, ,, ,,	× 1·15	=	,,	copper.
,, ,, ,,	× 1·47	=	,,	lead.
Cube inches ,,	× ·252	=	lbs. of	zinc.
,, ,, ,,	× ·26	=	,,	cast iron.
,, ,, ,,	× ·262	=	,,	tin.
,, ,, ,,	× ·288	=	,,	steel.
,, ,, ,,	× ·3	=	,,	brass.
,, ,, ,,	× ·32	=	,,	copper.
,, ,, ,,	× ·41	=	,,	lead.

Weight of Angle and T Iron.

Rule for calculating Weight of ordinary Angle and T Iron.

W = Weight of angle-iron per lineal foot.
B = Breadths of flanges added in decimal parts of a foot.
T = Thickness of angle-iron in decimal parts of a foot.
w = Weight of iron in lbs. per sq. ft. of the thickness of the angle-iron.

$$W = B - T \times w.$$

Table of the Weights per Foot Run, and Sectional Areas of Equal-sided Angle and T Irons.

The L and T irons are taken as uniformly thick in each part.

Breadth of flanges added in ins. and parts.	Thickness in parts of an inch.							
	$\frac{1}{4}$		$\frac{5}{16}$		$\frac{3}{8}$		$\frac{7}{16}$	
	lbs.	sec. area.	lbs.	sec. area.	lbs.	sec. area.	lbs.	sec. area.
3	2·31	·69	2·82	·84	3·31	·99	3·77	1·12
3¼	2·52	·75	3·08	·92	3·62	1·08	4·14	1·20
3½	2·73	·81	3·35	1·00	3·94	1·18	4·51	1·35
3¾	2·94	·88	3·61	1·08	4·25	1·27	4·88	1·46
4	3·15	·94	3·88	1·16	4·57	1·37	5·24	1·57
4½	3·57	1·06	4·40	1·32	5·20	1·50	5·98	1·76
5	3·99	1·19	4·92	1·47	5·83	1·74	6·71	2·00
5½	4·41	1·32	5·45	1·63	6·46	1·93	7·45	2·23
6	4·83	1·44	5·97	1·78	7·09	2·12	8·18	2·44
6½	5·25	1·57	6·50	1·94	7·72	2·31	8·92	2·67
7	5·67	1·69	7·02	2·10	8·35	2·50	9·65	2·88
7½	6·09	1·82	7·55	2·26	8·98	2·69	10·39	3·11
8	6·51	1·95	8·07	2·41	9·61	2·86	11·12	3·32
8½	6·93	2·07	8·60	2·57	10·24	3·07	11·86	3·55
9	7·35	2·20	9·12	2·73	10·97	3·25	12·59	3·77
9½	7·77	2·33	9·65	2·89	11·50	3·44	13·32	3·98
10	8·19	2·45	10·17	3·04	12·13	3·63	14·06	4·20
10½	8·61	2·58	10·69	3·20	12·76	3·82	14·80	4·43
11	9·03	2·70	11·22	3·35	13·39	4·00	15·53	4·65
11½	9·45	2·82	11·75	3·52	14·02	4·20	16·27	4·86
12	9·87	2·92	12·27	3·66	14·65	4·38	17·00	5·09

The weights are given in pounds and decimal parts; the sectional areas are given in inches and decimal parts.

TABLE OF THE WEIGHTS PER FOOT RUN, AND SECTIONAL AREAS OF EQUAL-SIDED ANGLE AND ⊤ IRONS—*continued.*

The ∟ and ⊤ irons are taken as uniformly thick in each part.

Breadth of flanges added in ins. and parts.	Thickness in parts of an inch.									
	$\frac{1}{2}$		$\frac{9}{16}$		$\frac{5}{8}$		$\frac{11}{16}$		$\frac{3}{4}$	
	lbs.	sec. area.	lbs.	sec. area.	lbs.	sec. area	lbs.	sec. area.	lbs.	sec. area.
3	4·20	1·26	—	—	—	—	—	—	—	—
3¼	4·62	1·38	—	—	—	—	—	—	—	—
3½	5·04	1·51	—	—	—	—	—	—	—	—
3¾	5·46	1·63	—	—	—	—	—	—	—	—
4	5·88	1·76	6·50	1·94	7·09	2·12	7·65	2·29	8·19	2·45
4½	6·72	2·01	7·44	2·23	8·14	2·44	8·81	2·64	9·45	2·82
5	7·56	2·26	8·39	2·52	9·19	2·75	9·96	2·93	10·71	3·15
5½	8·40	2·51	9·33	2·79	10·24	3·07	11·12	3·33	11·97	3·58
6	9·24	2·77	10·28	3·08	11·29	3·38	12·27	3·67	13·23	3·96
6½	10·08	3·02	11·22	3·36	12·34	3·69	13·43	4·02	14·49	4·34
7	10·92	3·28	12·17	3·65	13·39	4·01	14·58	4·36	15·75	4·72
7½	11·76	3·52	13·11	3·92	14·44	4·32	15·74	4·72	17·02	5·11
8	12·60	3·77	14·06	4·22	15·49	4·64	16·89	5·06	18·27	5·47
8½	13·44	4·02	15·00	4·49	16·54	4·95	18·05	5·40	19·53	5·82
9	14·28	4·28	15·95	4·78	17·59	5·27	19·20	5·75	20·79	6·22
9½	15·12	4·53	16·89	5·06	18·64	5·58	20·36	6·09	22·05	6·60
10	15·96	4·77	17·84	5·34	19·69	5·89	21·51	6·44	23·31	6·98
10½	16·80	5·03	18·78	5·62	20·74	6·21	22·67	6·78	24·57	7·35
11	17·64	5·28	19·73	5·91	21·79	6·52	23·82	7·13	25·83	7·73
11½	18·48	5·53	20·67	6·19	22·84	6·84	24·88	7·48	27·09	8·11
12	19·32	5·78	21·62	6·47	23·89	7·15	26·13	7·82	28·36	8·48

The weights are given in pounds and decimal parts; the sectional areas are given in inches and decimal parts.

Weight of a Superficial Foot of Wrought and Cast Iron, Brass, Copper, and Lead.

	Parts of an inch in thickness.								
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Wt. iron.	2·52	5·04	10·08	15·12	20·16	25·20	30·24	35·28	40·32
Cast iron.	2·35	4·69	9·37	14·06	18·75	23·44	28·12	32·81	37·50
Brass ..	2·84	5·68	11·35	17·03	22·70	28·38	34·05	39·72	45·40
Copper ..	2·89	5·78	11·56	17·34	23·12	28·90	34·68	40·46	46·24
Lead, cast	3·70	7·39	14·78	22·17	29·56	36·95	44·34	51·73	59·12
Zinc.....	2·34	4·69	9·38	14·06	18·75	23·44	28·13	32·81	37·50

Weight of Cast-iron Pipes

In lbs. per lineal foot. The weight of the two flanges may be reckoned = weight of one foot.

Bore. Inches.	Thickness of Metal.							
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
2	8·7	12·3	16·1	—	—	—	—	—
3	12·4	17·1	22·2	—	—	—	—	—
4	16·1	22·1	28·3	—	—	—	—	—
5	19·8	26·9	34·4	42·3	—	—	—	—
6	23·4	31·9	40·6	49·7	—	—	—	—
7	27·1	36·8	46·7	56·8	—	—	—	—
8	30·8	41·6	52·8	64·3	—	—	—	—
9	34·4	46·0	58·9	71·7	—	—	—	—
10	—	51·4	65·1	79	93·3	—	—	—
11	—	56·4	71	86·4	101·8	—	—	—
12	—	—	77·3	93·7	110·4	127·4	—	—
14	—	—	89·6	108·4	127·5	147	—	—
15	—	—	—	115·7	136·1	156·8	177·7	—
16	—	—	—	123·1	144·7	166·6	188·7	—
18	—	—	—	137·9	161·8	186·2	210·8	—
20	—	—	—	—	178·9	205·8	232·9	260·3
22	—	—	—	—	—	225·4	254·9	284·8
24	—	—	—	—	—	245·0	276·9	309·3

Weight of Cast-iron Balls and Solid Cylinders in lbs.

	Diameter in Inches.								
	1	2	3	4	5	6	7	8	9
Cast-iron balls	·136	1·10	3·70	8·7	17·1	29·5	47	70	100
Cast-iron cylinder 1 ft. long ..	2·4	9·9	21·9	39·0	61·0	89·0	120	156	198

Weight of Bells.

Size. Diameter.	Approximate Weight.		
	cwts.	qrs.	lbs.
6 inches	—	—	$4\frac{1}{2}$
7 "	—	—	$6\frac{1}{2}$
8 "	—	—	11
9 "	—	—	16
10 "	—	—	22
12 "	—	1	16
14 "	—	2	12
16 "	1	—	12
20 "	1	3	—
25 "	3	2	—
30 "	5	3	—
35 "	8	—	—
40 "	12	—	—
45 "	16	—	—
50 "	23	—	—

Weight of Copper Pipes in lbs. per Foot Lineal.

Bore. Inches.	Thickness in parts of inch.			
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$
$\frac{1}{2}$	·42	·94	1·60	2·27
$\frac{3}{4}$	·62	1·33	2·17	3·02
1	·79	1·69	2·66	3·77
$1\frac{1}{2}$	1·15	2·44	3·85	5·30
2	1·55	3·21	5·00	6·80
$2\frac{1}{2}$	1·94	3·97	6·13	8·31
3	2·3	4·73	7·24	9·84

Weight of a Square Foot of Sheet Metals in lbs.

Thickness Birmingham Wire Gauge.

Thickness. B. W. G.	Iron.	Copper.	Brass.	Thickness. B. W. G.	Iron.	Copper.	Brass.
30	·5	·58	·55	15	2·82	3·27	3·10
29	·56	·64	·61	14	3·12	3·60	3·43
28	·64	·74	·70	13	3·75	4·34	4·12
27	·72	·83	·79	12	4·38	5·08	4·81
26	·80	·92	·88	11	5·00	5·80	5·50
25	·90	1·04	·99	10	5·62	6·50	6·18
24	1·00	1·16	1·10	9	6·24	7·20	6·86
23	1·12	1·30	1·23	8	6·86	7·90	7·54
22	1·25	1·45	1·37	7	7·50	8·70	8·25
21	1·40	1·62	1·54	6	8·12	9·40	8·93
20	1·54	1·78	1·69	5	8·74	10·10	9·61
19	1·70	1·97	1·87	4	10·00	11·60	11·00
18	1·86	2·15	2·04	3	11·00	12·75	12·10
17	2·18	2·52	2·40	2	12·00	13·90	13·10
16	2·50	2·90	2·75	1	12·50	14·50	13·75

Weight of a Lineal Foot of Flat Bar Iron in lbs.

Breadth in inches.	Thickness in fractions of an inch.								
	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
1	·42	·63	·84	1·26	1·68	2·09	2·51	2·93	3·36
$1\frac{1}{8}$	·47	·70	·94	1·41	1·88	2·35	2·82	3·30	3·77
$1\frac{1}{4}$	·53	·78	1·05	1·57	2·09	2·61	3·14	3·67	4·19
$1\frac{3}{8}$	·58	·86	1·15	1·73	2·30	2·88	3·45	4·03	4·61
$1\frac{1}{2}$	·62	·95	1·26	1·88	2·51	3·14	3·76	4·40	5·02
$1\frac{5}{8}$	·67	1·02	1·36	2·04	2·72	3·41	4·09	4·73	5·45
$1\frac{3}{4}$	·74	1·10	1·47	2·20	2·93	3·67	4·40	5·14	5·87
$1\frac{7}{8}$	·79	1·17	1·57	2·35	3·14	3·93	4·71	5·50	6·29
2	·83	1·25	1·68	2·51	3·35	4·19	5·03	5·89	6·71
$2\frac{1}{8}$	·89	1·33	1·78	2·67	3·56	4·45	5·34	6·24	7·13
$2\frac{1}{4}$	·94	1·41	1·88	2·82	3·77	4·71	5·66	6·61	7·55
$2\frac{3}{8}$	1·00	1·49	1·99	2·98	3·97	4·97	5·98	6·98	7·97
$2\frac{1}{2}$	1·04	1·57	2·09	3·15	4·18	5·23	6·29	7·34	8·39
$2\frac{5}{8}$	1·10	1·65	2·20	3·29	4·39	5·49	6·60	7·71	8·81
$2\frac{3}{4}$	1·15	1·73	2·30	3·44	4·60	5·76	6·91	8·07	9·22
$2\frac{7}{8}$	1·20	1·81	2·41	3·62	4·82	6·03	7·24	8·45	9·65
3	1·25	1·89	2·51	3·77	5·03	6·29	7·55	8·81	10·07
$3\frac{1}{4}$	1·36	2·04	2·72	4·09	5·45	6·81	8·18	9·54	10·91
$3\frac{1}{2}$	1·46	2·20	2·93	4·40	5·86	7·33	8·80	10·28	11·74
$3\frac{3}{4}$	1·57	2·35	3·14	4·70	6·28	7·85	9·43	11·00	12·57
4	1·67	2·52	3·35	5·02	6·70	8·38	10·07	11·75	13·42
$4\frac{1}{4}$	1·78	2·67	3·56	5·34	7·11	8·90	10·69	12·48	14·25
$4\frac{1}{2}$	1·89	2·82	3·77	5·65	7·53	9·42	11·32	13·21	15·09
$4\frac{3}{4}$	2·00	3·00	3·98	5·96	7·95	9·94	11·94	13·94	15·92
5	2·10	3·15	4·19	6·28	8·37	10·47	12·57	14·67	16·76
$5\frac{1}{4}$	2·20	3·31	4·40	6·59	8·79	11·00	13·20	15·41	17·61
$5\frac{1}{2}$	2·31	3·45	4·61	6·90	9·21	11·52	13·83	16·14	18·45
$5\frac{3}{4}$	2·41	3·61	4·82	7·22	9·63	12·04	14·46	16·87	19·28
6	2·52	3·78	5·03	7·53	10·05	12·57	15·06	17·60	20·13

Sheet Iron—Weight of a Superficial Foot.

B. W. Gauge.	Dec. of an Inch.	Weight in Lbs.	B. W. Gauge.	Dec. of an Inch.	Weight in Lbs.
00000 ($\frac{1}{2}$)	·500	20·21	16 ($\frac{1}{16}$)	·063	2·55
0000	·450	18·19	17	·055	2·22
000	·437	17·66	18	·048	1·94
00 ($\frac{3}{8}$)	·375	15·16	19	·042	1·70
0	·340	13·74	20	·035	1·42
1 ($\frac{5}{16}$)	·312	12·61	21	·033	1·33
2	·284	11·48	22	·029	1·17
3	·261	10·55	23	·028	1·13
3—4 ($\frac{1}{4}$)	·250	10·10	24	·025	1·01
4	·239	9·66	25	·021	·85
5	·217	8·77	26	·020	·81
6	·208	8·41	27	·018	·73
7 ($\frac{3}{16}$)	·187	7·56	28	·015	·61
8	·166	6·71	29	·013	·53
9	·158	6·39	30	·012	·49
10	·137	5·54	31	·010	·40
11 ($\frac{1}{8}$)	·125	5·05	32	·009	·36
12	·109	4·41	33	·008	·32
13	·094	3·80	34	·007	·28
14	·080	3·23	35	·005	·20
15	·072	2·91	36	·004	·16

Weight of Nuts and Bolt-heads in lbs.

Diameter of bolt in inches ..	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
Weight of hexagon nut and head	·017	·057	·128	·267	·43	·73
Weight of square nut and head	·021	·069	·164	·320	·55	·88

Diam. of bolt in inches	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3
Weight of hexagon nut and head..	1·10	2·14	3·78	5·6	8·75	17	28·8
Weight of square nut and head..	1·31	2·56	4·42	7·0	10·5	21	36·4

WEIGHT OF A LINEAL FOOT OF ROUND AND SQUARE BAR IRON IN LBS.

Diameter or Side.	Square Bars.	Round Bars.	Breadth or Diam. in inches.	Square Bars.	Round Bars.	Breadth or Diam. in inches.	Square Bars.	Round Bars.
$\frac{1}{4}$	·209	·164	$1\frac{1}{4}$	5·25	4·09	3	30·07	23·60
$\frac{5}{16}$	·326	·256	$1\frac{3}{8}$	6·35	4·96	$3\frac{1}{4}$	35·28	27·70
$\frac{3}{8}$	·470	·369	$1\frac{1}{2}$	7·51	5·90	$3\frac{1}{2}$	40·91	32·13
$\frac{7}{16}$	·640	·502	$1\frac{5}{8}$	8·82	6·92	$3\frac{3}{4}$	46·97	36·89
$\frac{1}{2}$	·835	·656	$1\frac{3}{4}$	10·29	8·03	4	53·44	41·97
$\frac{9}{16}$	1·057	·831	$1\frac{7}{8}$	11·74	9·22	$4\frac{1}{4}$	60·32	47·38
$\frac{5}{8}$	1·305	1·025	2	13·36	10·49	$4\frac{1}{2}$	67·63	53·12
$\frac{11}{16}$	1·579	1·241	$2\frac{1}{8}$	15·08	11·84	$4\frac{3}{4}$	75·35	59·18
$\frac{3}{4}$	1·879	1·476	$2\frac{1}{4}$	16·91	13·27	5	83·51	65·58
$\frac{13}{16}$	2·205	1·732	$2\frac{3}{8}$	18·84	14·79	$5\frac{1}{4}$	92·46	72·30
$\frac{7}{8}$	2·556	2·011	$2\frac{1}{2}$	20·87	16·39	$5\frac{1}{2}$	101·03	79·35
$\frac{15}{16}$	2·936	2·306	$2\frac{5}{8}$	23·11	18·07	$5\frac{3}{4}$	110·43	86·73
1	3·34	2·62	$2\frac{3}{4}$	25·26	19·84	6	120·24	94·43
$1\frac{1}{8}$	4·22	3·32	$2\frac{7}{8}$	27·61	21·68	—	—	—

To convert into weight of other metals, multiply tabular No. for cast iron by ·93, for steel × 1·02, for copper × 1·15, for brass × 1·09, for lead × 1·47, for zinc × ·92.

HOOP IRON.—Dimensions and Weight in lbs. per foot run.

Breadth	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 in.	$1\frac{1}{8}$	$1\frac{1}{4}$
B. W. Gauge	21	20	19	18	17	16
Weight per lineal foot .	·0666	·0875	·1216	·1636	·21	·27
Breadth	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.	$2\frac{1}{4}$	$2\frac{1}{2}$
B. W. Gauge	15	15	14	13	13	12
Weight per lineal foot .	·33	·36	·484	·634	·714	·91

Hoop Iron.—Weight of 100 Lineal Feet.

B. W. Gauge.	Width in ins.	Weight in lbs.	B. W. Gauge.	Width in ins.	Weight in lbs.
11	3	126·30	15	$1\frac{1}{2}$	36·38
11	$2\frac{3}{4}$	115·78	15	$1\frac{3}{8}$	33·34
12	$2\frac{1}{2}$	91·78	16	$1\frac{1}{4}$	26·52
12	2	73·42	17	$1\frac{1}{8}$	20·84
13	$2\frac{1}{4}$	71·23	18	1	16·17
13	2	63·32	19	$\frac{7}{8}$	12·39
13	$1\frac{3}{4}$	55·41	20	$\frac{3}{4}$	8·84
14	$1\frac{3}{4}$	47·15	20	$\frac{5}{8}$	6·95
14	$1\frac{1}{2}$	40·42			

Weight of Lead Pipes in lbs. per Foot Lineal.

Bore. Inch.	Common.	Middling.	Strong.
	lbs.	lbs.	lbs.
$\frac{1}{2}$	1·07	—	—
$\frac{3}{4}$	1·6	1·8	2
1	2·0	2·6	2·8
$1\frac{1}{4}$	3·0	3·7	4·4
$1\frac{1}{2}$	4·0	4·7	5·6
2	5·0	6·0	7·0
$2\frac{1}{2}$	7·0	8·6	10·0

CHAINS.—Weight of Lineal Foot.

Diam. of Link in ins.	Weight in lbs.	Diam. of Link in ins.	Weight in lbs.	Diam. of Link in ins.	Weight in lbs.
$\frac{1}{4}$	·63	$\frac{3}{4}$	5·33	$1\frac{1}{4}$	14·50
$\frac{5}{16}$	·91	$\frac{13}{16}$	6·16	$1\frac{5}{16}$	16·00
$\frac{3}{8}$	1·33	$\frac{7}{8}$	7·16	$1\frac{3}{8}$	17·66
$\frac{7}{16}$	1·50	$\frac{15}{16}$	8·16	$1\frac{1}{2}$	20·83
$\frac{1}{2}$	2·33	1	9·33	$1\frac{5}{8}$	24·17
$\frac{9}{16}$	3·00	$1\frac{1}{16}$	10·50	$1\frac{3}{4}$	28·33
$\frac{5}{8}$	3·67	$1\frac{1}{8}$	11·83	$1\frac{7}{8}$	32·50
$\frac{11}{16}$	4·50	$1\frac{3}{16}$	13·16	2	38·33

WEIGHT OF SPIKES.

Size.		Weight.
5-inch	=	10 lbs. per hundred.
6 "	=	20 " "
7 "	=	30 " "
8 "	=	45 " "
9 "	=	60 " "

FLOORING BRADS.

2 inches long	weight 4 lbs.	per 1000.
$2\frac{1}{4}$ "	" 10 lbs.	"
$2\frac{1}{2}$ "	" 15 lbs.	"
$3\frac{1}{4}$ "	" 20 lbs.	"

WEIGHT OF NAILS FOR SLATING.

Composition.

$1\frac{1}{2}$ in. long .. .. = 5 lbs. 15 oz. per 1000.
$1\frac{3}{4}$ " .. .. = 8 " 1 " "

Wrought-copper Nails (Strong).

1 in. long	.. .. =	3 lbs. 4 oz. per 1000.
1½ ,,	.. .. =	9 ,, 9 ,, ,,
2 ,,	.. .. =	11 ,, 4 ,, ,,
2½ ,,	.. .. =	29 ,, 4 ,, ,,
3 ,,	.. .. =	40 ,, 0 ,, ,,

Coppers.

A 2-gallon copper weighs	about 3 lbs.
A 4 ,, ,, ,, ...	,, 6 ,,
A 6 ,, ,, ,, ...	,, 9 ,,
A 9 ,, ,, ,, ...	,, 14 ,,
A 12 ,, ,, ,, ...	,, 18 ,,
A 15 ,, ,, ,, ...	,, 23 ,,

Weight of Metals per Cubic Foot in Lbs.

Aluminium	162
Brass, cast	525
Bronze	524
Copper, cast	550
,, sheet	555
Gun-metal	549
Iron, wrought	487
,, cast	450
Lead, milled	712
,, cast	710
Steel	490
Tin, cast	456
Type-metal	653
Zinc	459

WEIGHT OF MISCELLANEOUS ARTICLES.

Articles.	Weight of a Cubic Foot.	Cubic Feet = 1 ton.
	lbs.	
Ashes	37	$60\frac{1}{2}$
Asphalte	156	—
Bath stone	123	—
Brickwork, in mortar	110	22
,, in cement	112	20
Caen stone	125	—
Cement, Portland	78	—
,, Roman	60	—
,, ,, and sand, equal parts	112	—
Chalk from	140	$15\frac{1}{2}$
Chalk to	166	$13\frac{3}{4}$
Clay from	120	$18\frac{2}{3}$
Clay to	125	17
Coal from	50	$26\frac{2}{3}$
Coal to	58	45
,, Navy allowance	—	48
Coke	47	48
Concrete	120	$18\frac{2}{3}$
Earth from	95	18
Earth to	126	$23\frac{1}{2}$
Flint	164	$13\frac{2}{3}$
Glass, crown	157	$14\frac{1}{4}$
,, flint	187	12
,, plate	184	$12\frac{1}{6}$
Granite, Aberdeen	166	—
,, Cornish	166	—
,, Guernsey	185	—
Gravel	112	$21\frac{3}{4}$
,, coarse	120	$18\frac{2}{3}$
Hay	5	Truss = 56 to 60 lbs.
,, well pressed	8	—
Iron, cast	450	5
,, wrought	487	$4\frac{5}{8}$

Weight of Miscellaneous Articles—*continued.*

Articles.	Weight of a Cubic Foot.	Cubic Feet = 1 ton.
	lbs.	
Kentish ragstone	166	—
Lime, stone..	53	42½
„ chalk	44	51
Marble, average	170	—
Marl	120	18
Masonry, rubble	140	—
„ flint	148	—
Mortar, old	88	25½
„ new	119	19
Night-soil	—	18
Plaster of Paris, cast..	80	—
Portland stone	145	—
Sand, from	90	23½ to 25
„ river	118	19
Sandstone, Craigleith	145	—
Shingle	89	25½
Slate	180	12½
Snow	8	—
Straw	3½	Truss = 36 lbs.
„ well pressed	5⅓	—
Tar	63	—
Thames ballast	—	20
Tiles, average	12	20
Water	62½	35¾
„ sea	64	35
Whinstone, Scotch	172	—
Yorkshire paving	156	—

Weight of Timber, Stone, &c., see under their respective names.

WEIGHTS AND MEASURES.

Long Measure.

inches.						
12 =	1 foot.					
36 =	3 =	1 yard.				
72 =	6 =	2 =	1 fathom.			
198 =	16·5 =	5·5 =	2·75 =	1 perch or pole		
7920 =	660	= 220	= 110	= 40 =	1 furlong.	
63360 =	5280	= 1760	= 880	= 320 =	8 =	1 mile.

A cable = 120 fathoms = 720 feet

Square Measure.

inches.						
144 =	1 foot.					
1296 =	9 =	1 yard.				
39204 =	272·25 =	30·25 =	1 perch.			
1568160 =	10890	= 1210	= 40 =	1 rood.		
6272640 =	43560	= 4840	= 160 =	4 =	1 acre.	

Square Measure (Land).

links.			
625 =	1 perch.		
10000 =	1 chain.		
25000 =	2·5 =	1 rood.	
100000 =	10	= 4 =	1 acre.

1 chain wide .. = 8 acres per mile.
10 square chains = 1 acre.
1 hectare .. = 2·471143 acres.

1 square mile $\begin{cases} = 27878400 \text{ sq. feet.} \\ = 3097600 \text{ sq. yards.} \\ = 640 \text{ acres.} \end{cases}$

Acres × ·0015625 = sq. miles.
Sq. yds. × ·000000323 = sq. miles.

Land Measure.

inches.			
7·92 =	1 link.		
792	= 100 =	1 chain.	
63360	= 8000 =	80 =	1 mile.

Solid Measure.

cubic inches.		
1728 =	1 cubic foot.	
46656 =	27 =	1 cubic yard.

Scotch and Irish Measure.

English mile	= 1760 yards	= 1·00000
Scotch „	= 1984 „	= 1·12159
Irish „	= 2240 „	= 1·27273
English acre	= 4840 sq. yds.	= 1·00000
Scotch „	= 6150·4 „	= 1·27074
Irish „	= 7840 „	= 1·61983

Dry Measure.

gallons.					
2 =	1 peck.				
8 =	4 =	1 bushel = 1·284 cubic foot.			
64 =	32 =	8 =	1 quarter.		
320 =	160 =	40 =	5 =	1 load or wey.	
640 =	320 =	80 =	10 =	2 =	1 last.

Nautical Measure.

Nautical mile.		
1 = 6082·61 feet.		
3 =	1 league.	
60 =	20 =	1 degree = 69·121 English miles.

Liquid Measure.

cubic inches.							
34·66 =	1 pint.						
69·318 =	2 =	1 quart.					
277·274 =	8 =	4 =	1 gallon.				
11645·508 =	336 =	168 =	42 =	1 tierce.			
17467·262 =	504 =	252 =	63 =	$1\frac{1}{2}$ =	1 hogshead.		
23291·016 =	672 =	336 =	84 =	2 =	$1\frac{1}{3}$ =	1 puncheon.	
34936·524 =	1008 =	504 =	126 =	3 =	2 =	$1\frac{1}{2}$ =	1 pipe.
69873·048 =	2016 =	1008 =	252 =	6 =	4 =	3 =	2 = 1 tun.

Troy Weight.

grains.				
24 =	1 pennyweight.			
480 =	20 =	1 ounce.		
5760 =	240 =	12 =	1 pound = 22·816 cubic inches of distilled water at 62° Fahr.	

Apothecaries' Weight.

grains.				
20 =	1 scruple.			
60 =	3 =	1 drachm.		
480 =	24 =	8 =	1 ounce.	
5760 =	288 =	96 =	12 =	1 pound.

Avoirdupois Weight.

drachms.					
16 =	1 ounce = 437·5 grains troy.				
256 =	16 =	1 pound = 1·2153 lb. troy.			
7168 =	448 =	28 =	1 quarter.		
28672 =	1792 =	112 =	4 =	1 cwt.	
573440 =	35840 =	2240 =	80 =	20 =	1 ton.

Miscellaneous.

A cable's length	= 240 yards.
A geographical degree	= 69·121 English miles.
The old wine gallon	= 231 cubic inches.
" ale gallon	= 281 "
A stone	= 14 lbs.
20 articles..	= 1 score.
12 dozen	= 1 gross.
A cord of wood	= 128 cubic feet.
A faggot of steel	= 120 lbs.
A cask of blacklead	= 11½ cwt.
Pig of ballast	= 56 lbs.
Truss of straw	= 36 lbs.
Truss of hay	= 56 lbs.
A load of hay or straw	= 36 trusses.
A ton of Portland cement	= 10 sacks or 6 casks.
A barrel of tar	= 25 gallons.
A ton of freight by measurement	= 40 cubic feet.

Foreign Measures compared with English.

1 mètre	..	France, Belgium, Holland, Italy	=	3·2809 English feet.
1 vara	..	Portugal, Brazil	=	3·934 „ „
1 pik	..	Egyptian	=	2·515 „ „
1 yard	..	Spanish	=	2·738 „ „
1 foot	..	Austrian	=	1·037 „ „
1 foot	..	Prussia, Denmark, Norway	=	1·029 „ „
1 foot	..	Swedish	=	0·974 „ „

Decimal Equivalents of Inches, Feet, and Yards.

Fractions of an Inch.	Decims. of an Inch.	Decims. of a Foot.
	·0625 =	·00521
⅛	·125 =	·01041
	·1875 =	·01562
¼	·25 =	·02083
	·3125 =	·02604
⅜	·375	·03125
	·4375 =	·03646
½	·5 =	·04166
	·5625 =	·04687
⅝	·625 =	·05208
	·6875 =	·05729
¾	·75 =	·06250
	·8125 =	·06771
⅞	·875 =	·07292
	·9375 =	·07812
1 inch	1·00 =	·08333

Inches.	Feet.	Yards.
1 =	·0833 =	·0278
2 =	·1660 =	·0555
3 =	·25 =	·0833
4 =	·3333 =	·1111
5 =	·4166 =	·1389
6 =	·5 =	·1667
7 =	·5833 =	·1944
8 =	·6666 =	·2222
9 =	·75 =	·25
10 =	·8333 =	·2778
11 =	·9166 =	·3055
12 =	1·000 =	·3333

WEIGHT of Men and Animals (average).

A crowd of men closely packed = 84 lbs. per foot super.
A horse (light for riding) = 8 cwt.
A horse (cavalry) = 11 cwt.
A horse (strong for carting) = 14 cwt.
A sheep = ¾ cwt.
A pig = 1¼ cwt.
A cow (about) 6½ cwt.
An ox = 8 cwt.

WIND, PRESSURE OF, AGAINST WALLS, &c.

Force per Square Foot.	Authority.
$57\frac{3}{4}$ lbs.	Tredgold.
55 „	Dr. Nichol.

To determine the pressure of wind per square foot, equal to the stability of a square stalk,

Rule.—Multiply the weight of the stalk in pounds by twice its width in feet at the base, and divide the product by the square of its height in feet and by the sum of its top and bottom breadths in feet.

Example:

Let w = Weight of stalk in pounds = 90,000.
p = Pressure of wind in pounds per square foot equal to stability of stalk.
h = Height of stalk in feet = 50 feet.
b = Breadth of stalk at base in feet = 4 feet.
c = „ „ top „ = 2 „

Then $\dfrac{90{,}000 \times 4 \times 2}{2{,}500\ (4 \times 2)} = p = 48$ pounds per square foot.

If the stalk be circular, proceed as before, but replace the breadths by the diameter, and multiply the result by 2.

PRESSURE OF WIND.

Miles per hour.	Pressure in lbs. per Square Foot.	Remarks.
1	0·005	Hardly perceptible.
2	0·020	Just perceptible.
3	0·004	
4	0·079	Gentle, pleasant wind.
5	0·123	
10	0·492	Brisk gale.
15	1·107	
20	1·968	Very brisk.
25	3·075	
30	4·429	High wind.
35	6·027	
40	7·873	Very high.
45	9·963	
50	12·300	Storm.
60	17·715	Great storm.
80	31·490	Hurricane.

ZINC, MEMORANDA.

Inferior zinc is spotty and unequal in colour, and is darker than the pure material.

In laying zinc all contact with iron or lime should be avoided.

WEIGHT AND GAUGE OF ZINC.

Gauge.	Weight per Foot super.	Gauge.	Weight per Foot super.
No. 10	14 oz.	No. 14	22 oz.
No. 11	16 oz.	No. 15	24 oz.
No. 12	18 oz.	No. 16	26 oz.
No. 13	20 oz.		

24 oz. zinc is generally adopted for flats, and from 20 to 24 oz. zinc for gutters.

Zinc sheets are 7 ft. and 8 ft. long, and 2 ft. 8 and 3 ft. wide.

TABLE OF EQUIVALENT GAUGES AND WEIGHT PER SQUARE FOOT.

Thickness.	B.W.G.	Zinc Gauge.	Weight per Square Foot.
	21	13	1·2234 lb. = $19\frac{1}{2}$ oz.
	20	14	1·3587 „ = $21\frac{3}{4}$ „
	19	15	1·4930 „ = 24 „
	18	16	1·6292 „ = 26 „

Zinc Gauge should be specified.

Feet and Inches, and their Equivalent Links.

Links.	Ft.	Inches.	Links.	Ft.	Inches.	Links.	Ft.	Inches.
1	0	7·92	35	23	1·20	68	44	10·56
2	1	3·84	36	23	9·12	69	45	6·48
3	1	11·76	37	24	5·04	70	46	2·40
4	2	7·68	38	25	0·96	71	46	10·32
5	3	3·60	39	25	8·88	72	47	6·24
6	3	11·52	40	26	4·80	73	48	2·16
7	4	7·44	41	27	0·72	74	48	10·08
8	5	3·36	42	27	8·64	75	49	6·00
9	5	11·28	43	28	4·56	76	50	1·92
10	6	7·20	44	29	0·48	77	50	9·84
11	7	3·12	45	29	8·40	78	51	5·76
12	7	11·04	46	30	4·32	79	52	1·68
13	8	6·96	47	31	0·24	80	52	9·60
14	9	2·88	48	31	8·16	81	53	5·52
15	9	10·80	49	32	4·08	82	54	1·44
16	10	6·72	50	33	0·00	83	54	9·36
17	11	2·64	51	33	7·92	84	55	5·28
18	11	10·56	52	34	3·84	85	56	1·20
19	12	6·48	53	34	11·76	86	56	9·12
20	13	2·40	54	35	7·68	87	57	5·04
21	13	10·32	55	36	3·60	88	58	0·96
22	14	6·24	56	36	11·52	89	58	8·88
23	15	2·16	57	37	7·44	90	59	4·80
24	15	10·08	58	38	3·66	91	60	0·72
25	16	6·00	59	38	11·28	92	60	8·64
26	17	1·92	60	39	7·20	93	61	4·56
27	17	9·84	61	40	3·12	94	62	0·48
28	18	5·76	62	40	11·04	95	62	8·40
29	19	1·68	63	41	6·96	96	63	4·32
30	19	9·60	64	42	2·88	97	64	0·24
31	20	5·52	65	42	10·80	98	64	8·16
32	21	1·44	66	43	6·72	99	65	4·08
33	21	9·36	67	44	2·64	100	66	0·00
34	22	5·28						

Experiments on Corsehill Stone.

Dimensions.	Base Area.	Cracked slightly.			Crushed, Steelyard dropped.		
		Stress.	Per sq. in	Per sq. ft.	Stress.	Per sq. in	Per sq. ft.
inches.	sq. in.	lbs.	lbs.	tons.	lbs.	lbs.	tons.
5·90 5·90×5·92	34·92	298,620	8551	549·9	349,180	9999	643·0
5·98 5·99×5·98	35·82	263,180	7347	472·4	285,840	7979	513·1
6·00 5·98×5·98	35·76	200,800	5615	361·0	207,310	5797	372·7
Mean		254,200	7171	461·1	280,776	7925	509·6

Table showing the Price of Timber per Foot according to the Price per Load.

Per Load of 50 Cubic Feet.			Per Cubic Foot.	Per Superficial Foot of			
				$1\frac{1}{2}$ inch.	1 inch.	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.
£	s.	d.	d.	d.	d.	d.	d.
2	0	0	10	$1\frac{2}{10}$	$\frac{4}{5}$	$\frac{12}{20}$	$\frac{4}{10}$
2	10	0	12	1^{5}	1	^{15}	^{5}
3	0	0	14	1^{8}	$1\frac{1}{5}$	^{18}	^{6}
3	10	0	17	2^{1}	1^{2}	1^{1}	^{7}
4	0	0	19	2^{4}	1^{3}	1^{4}	^{8}
4	10	0	22	2^{7}	1^{4}	1^{7}	^{9}
5	0	0	24	3	2	1^{10}	1
5	10	0	26	3^{3}	$2\frac{1}{5}$	1^{13}	1^{1}
6	0	0	29	3^{6}	2^{2}	1^{16}	1^{2}
6	10	0	31	$3\frac{9}{10}$	$2\frac{3}{5}$	$1\frac{19}{20}$	$1\frac{3}{10}$
7	0	0	34	4^{2}	2^{4}	2^{2}	1^{4}
7	10	0	36	4^{5}	3	2^{5}	1^{5}
8	0	0	38	4^{8}	$3\frac{1}{5}$	2^{8}	1^{6}
8	10	0	41	5^{1}	3^{2}	2^{11}	1^{7}
9	0	0	43	5^{4}	3^{3}	2^{14}	1^{8}
9	10	0	46	5^{7}	3^{4}	2^{17}	1^{9}

PRICES OF TIMBER—*continued.*

Per Load of 50 Cubic Feet.			Per Cubic Foot.	Per Superficial Foot of			
				$1\frac{1}{2}$ inch.	1 inch.	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.
£	s.	d.	d.	d.	d.	d.	d.
10	0	0	48	6	4	3	2
10	10	0	50	6^{3}	$4\frac{1}{5}$	3^{3}	2^{1}
11	0	0	53	6^{6}	4^{2}	3^{6}	2^{2}
11	10	0	55	6^{9}	4^{3}	3^{9}	2^{3}
12	0	0	58	7^{2}	4^{4}	3^{12}	2^{4}
12	10	0	60	7^{5}	5	3^{15}	2^{5}
13	0	0	62	7^{8}	$5\frac{1}{5}$	3^{18}	2^{6}
13	10	0	65	8^{1}	5^{2}	4^{1}	2^{7}
14	0	0	67	8^{4}	5^{3}	4^{4}	2^{8}
14	10	0	70	8^{7}	5^{4}	4^{7}	2^{9}
15	0	0	72	9	6	4^{10}	3
15	10	0	74	2^{3}	$6\frac{1}{5}$	4^{13}	3^{1}
16	0	0	77	9^{6}	6^{2}	4^{16}	3^{2}
16	10	0	79	9^{9}	6^{3}	4^{19}	3^{3}
17	0	0	82	10^{2}	6^{4}	5^{2}	3^{4}
17	10	0	84	10^{5}	7	5^{5}	3^{5}
18	0	0	86	10^{8}	$7\frac{1}{5}$	5^{8}	3^{6}
18	10	0	89	11^{1}	7^{2}	5^{11}	3^{7}
19	0	0	91	11^{4}	7^{3}	5^{14}	3^{8}
19	10	0	94	11^{7}	7^{4}	5^{17}	3^{9}
20	0	0	96	12	8	6	4
20	10	0	98	12^{3}	$8\frac{1}{5}$	6^{3}	4^{1}
21	0	0	101	12^{6}	8^{2}	6^{6}	4^{2}
21	10	0	103	12^{9}	8^{3}	6^{9}	4^{3}
22	0	0	106	13^{2}	8^{4}	6^{12}	4^{4}
22	10	0	108	13^{5}	9	6^{15}	4^{5}
23	0	0	110	13^{8}	$9\frac{1}{5}$	6^{18}	4^{6}
23	10	0	113	14^{1}	9^{2}	7^{1}	4^{7}
24	0	0	115	14^{4}	9^{3}	7^{4}	4^{8}
24	10	0	118	14^{7}	9^{4}	7^{7}	4^{9}
25	0	0	120	15	10	7^{10}	5

TABLE SHOWING THE VALUE OF DIFFERENT SCANTLINGS IN PENCE PER FOOT RUN, ACCORDING TO THE PRICE OF TIMBER, AT 3s. 6d. PER FOOT CUBE.

Ins.	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
2	1	1½	1¾	2	2¼	2½	3	3¼	3½	3¾	4	4½	4¾	5	5¼	5½	5¾	6	6½	6¾	7
2½	1½	1¾	2¼	2½	3	3½	3¾	4	4½	4¾	5	5½	5¾	6¼	6½	7	7½	7¾	8	8½	8¾
3	1¾	2¼	2½	3	3½	4	4½	4¾	5¼	5¾	6	6½	7	7½	8	8½	8¾	9¼	9½	10	10½
3½	2	2½	3	3½	4	4½	5	5½	6	6¾	7	7¾	8	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¼
4	2¼	3	3½	4	4¾	5¼	5¾	6½	7	7½	8	8¾	9¼	10	10½	11	11¾	12¼	12¾	13½	14
4½	2½	3¼	4	4½	5¼	6	6½	7¼	8	8½	9½	10	10½	11	11¾	12½	13	13¾	14½	15	15¾
5	3	3¾	4½	5	5¾	6½	7¼	8	8¾	9½	10¼	11	11¾	12½	13	14	14½	15½	16	16¾	17½
5½	3¼	4	4¾	5½	6½	7¼	8	8¾	9½	10½	11¼	12	12¾	13¾	14½	15¼	16	16¾	17¾	18½	19¼
6	3½	4½	5¼	6	7	8	8¾	9½	10½	11½	12¼	13	14	15	15¾	16½	17½	18½	19¼	20	21
6½	3¾	4¾	5¾	6¾	7½	8½	9½	10½	11½	12½	13¼	14½	15	16	17	18	19	20	21	21¾	22¾
7	4	5	6	7¼	8	9¼	10¼	11¼	12¼	13¼	14¼	15¼	16¼	17½	18½	19½	20½	21½	22½	23½	24½
7½	4½	5½	6½	7¾	8¾	10	11	12	13	14¼	15¼	16½	17½	18½	19¾	20¾	22	23	24	25	26¼
8	4¾	5¾	7	8	9¼	10½	11¾	12¾	14	15	16¼	17½	18¾	19¾	21	22	23½	24½	25¾	26¾	28
8½	5	6¼	7½	8¾	10	11	12½	13¾	15	16	17½	18½	19¾	21	22¼	23½	24¾	26	27¼	28½	29¾
9	5¼	6½	8	9½	10½	11¾	13	14½	15¾	17	18½	19¾	21	22¼	23½	25	26¼	27½	29	30¼	31½
9½	5½	7	8¼	9¾	11	12½	14	15¼	16½	18	19½	20¾	22	23½	25	26½	27¾	30	30½	32	33¼
10	5¾	7¼	8¾	10¼	11¾	13	14½	16	17½	19	20½	22	23¼	24¾	26¼	27¾	29	30½	32	33½	35
10½	6	7¾	9¼	10¾	12¼	13¾	15¼	17	18½	20	21½	23	24½	26	27½	29	30½	32	33¾	35¼	36¾
11	6½	8	9½	11¼	12¾	14½	16	17¾	19¼	21	22½	24	25¾	27¼	29	30½	32	33¾	35½	37	38½
11½	6¾	8½	10	11¾	13½	15	16¾	18½	20	21¾	23½	25	26¾	28½	30¼	32	33½	35¾	37	38½	40¼
12	7	8¾	10½	12¼	14	15¾	17½	19¼	21	22¾	24½	26¼	28	29¾	31½	33¼	35	36¾	38½	40¼	42

MEMORANDA

OF

BUILDERS' PRICES.

PRICES IN THE YEARS 1703 AND 1876.

		1703.			1876.		
		£	s.	d.	£	s.	d.
Brickwork	per rod ..	5	10	0	15	0	0
Weather boarding	per square	0	13	0	1	10	0
Plain tiling, including laths, &c.	"	1	10	0	2	15	0
Lath and plaster ceilings,	per yard .	0	0	6	0	1	11
Sheet lead on roofs	per cwt...	0	16	0	1	12	0
Lead quarries		0	0	6	0	1	6

N.B.—As the prices of materials are constantly varying, it will be prudent to get special quotations for large contracts.

EXCAVATOR.

Prices per Cubic Yard.

	s.	d.
Digging in common soils and throwing out, not exceeding 6 ft. in depth	0	7½
Digging in gravel or stiff clay	0	8½
Ditto in common soils, above 6 ft. in depth	0	10
Ditto in gravel or stiff clay, ditto	0	11
Filling into barrows and wheeling, for first run of 20 yards .. .. .. add	0	3
Wheeling, for every additional run of 20 yards .. .. add	0	2
Basketing out ground .. .. .. "	0	8½
Filling into carts and carting, not exceeding one mile .. .. add	3	3
Carting, for every additional mile .. "	1	0
Trenching out and levelling foundations, filling in, and ramming to the walls, as the works proceed .. .. .. add	0	9
Clay, tempered and laid 6 in. deep and puddled .. .. per sup. yard	3	0
Dressing and soiling slopes of embankments and cuttings .. .. per sup. yard	0	3½
Forming bank and ditches per yard run	0	7

Excavators' Memoranda. See page 50.

WELLS.

Wells dug and steened, including tackle, baskets, and stages (exclusive of the bricks), not exceeding 30 feet deep, per foot in depth.

	Diameter of Digging.		Diameter in Clear of Brickwork.		Gallons in each Foot in Depth.	Price per Foot in Depth.		
	ft.	in.	ft.	in.	gals.	£	s.	d.
Half Brick thick.	3	6	2	9	39	0	4	0
	4	6	3	9	68	0	5	0
	5	3	4	6	96	0	6	6
	5	9	5	0	120	0	8	0
	6	3	5	6	145	0	10	0
One Brick thick.	7	6	6	0	174	0	13	6
	8	0	6	6	204	0	15	0
	8	6	7	0	236	0	17	0
	9	0	7	6	270	1	1	0
	9	6	8	0	308	1	4	0
	10	0	8	6	348	1	6	0
	10	6	9	0	390	1	8	0
	11	0	9	6	434	1	11	0
	11	6	10	0	481	1	15	0
	12	0	10	6	530	2	0	0
	12	6	11	0	582	2	3	0
	13	0	11	6	637	2	7	0

Where it is requisite to have curbs or pumps, with the labour to the same, they must be charged extra, according to value; extra price if quicksands or rocks occur.

Drains.

Glazed Stoneware Tubular Pipes, with Socket-joints.
(Prime cost of pipes.)

	Price per Foot Run.						
	3-in.	4-in.	6-in.	9-in.	12-in.	15-in.	18-in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	0 4½	0 6	0 8	1 2	1 10	3 1	4 0
Bends and elbows, each ..	1 3	1 9	2 3	3 6	5 6	9 0	12 0
Single junctions, 2 feet lengths ..	1 6	2 0	2 8	4 8	7 4	12 4	16 0
Double junctions, ditto ..	2 3	3 0	4 0	7 0	11 0	18 6	24 0
*Siphons.. ..	2 6	3 6	6 0	10 0	15 0	—	—
Pipe and block traps, with galvanized iron flaps, each ..	—	4 0	5 0	7 6	12 0	25 0	—

* With inlet in centre, 1s. each extra.
The above are London District prices. Midland District 10 per cent. less.

Miscellaneous Articles.

Stoneware. Prices at Warehouse.

	£	s.	d.
Yard gulley, with funnel, top, and trap, 4-in. outlet .. .. each	0	4	0
Water-closet pans .. .. „	0	5	0
„ „ with traps, 4s. „ to	0	7	6
Traps .. .. „	0	2	6
Stoneware air-brick, 9 in. × 3 in. ..	0	0	4
„ „ 9 in. × 6 in. ..	0	1	0

	9 in.	10 in.	12 in.
Flue-pipe, socket joints	1s. 2d.	1s. 6d.	1s. 10d.
„ butt joints ..	1s. 1d.	1s. 5d.	1s. 8d.

Barrel Drains.

(Price exclusive of digging.)

	Per Foot Run.			
	In Mortar.		In Cement.	
	s.	d.	s.	d.
9-in. barrel drain, ½-brick rim	1	7	2	1
12-in. " "	1	11	2	4
15-in. " "	2	3	2	10
18-in. " "	2	9	3	5
15-in. " 1-brick rim	5	3	6	9
18-in. " "	5	9	7	6
24-in. " "	6	9	8	6
30-in. " "	8	9	11	0
Render inside ditto, per ft. sup.	..		0	3
	per foot run.			
Small drains, 2 courses high, with pantile bottom and brick flat top	0	11	1	2
Ditto, 9 in. wide, 3 courses high, paved bottom and arched top	1	6	2	0
Ditto ditto, 12 in. wide and 4 courses high	2	0	2	5

Concrete.

Concrete in foundations, composed of 1 of ground stone lime and 6 of gravel or ballast and sand, per cubic yard, from 6s. 6d. to	0	9	0
Ditto ditto under floors, 6 in. thick, per sup. yard	0	4	0
Concrete, with Portland cement, in walls 9 in. thick, per sup. yard	0	4	9
Ditto ditto, per rod	10	0	0

The following prices have been quoted for hollow concrete blocks, 2 ft. long, 1 ft. wide, and 9 in. high, with V or joggle joints run with cement. It is said a bricklayer can lay 50 blocks per day, and that the blocks are nearly non-absorbent.

COMPARATIVE COST OF WALLING PER CUBIC FOOT.

Plain-faced Masonry.	Plain-faced Brickwork.	Plain-faced Concrete Block.
2*s*. 9*d*.	1*s*. 0*d*.	0*s*. 9*d*.
Moulded Masonry.	Moulded Brickwork.	Moulded Concrete Block.
4*s*. 6*d*.	1*s*. 3*d*.	1*s*. 0*d*.

Ornamental patterns have been produced in concrete blocks, cast in a wooden or iron mould, and at very low price, but a reliable price cannot as yet be given. Colours can also be given to the blocks by mixing stains with the cement.

Concrete made with gravel would be disintegrated by great heat, and is most liable to fractures. Concrete made with burnt clay, pounded shingle, slag, clinkers, &c., is the strongest.

By grinding a stone, and mixing with cement for a face, a concrete block can be produced to resemble the stone. For ornamental work, such as a pierced parapet, a great saving in cost can be made by this means, and the appearance of stone work retained.

Concrete cottage and farm, it is said, can be built for 20 per cent. less than brick.

Lascelles' patent consists of concrete slabs, 2 ft. × 3 ft., and 1 in. thick; the face side being cast in a mould to resemble tiles. The weight of a slab is about 50 lbs., and costs from 2*d.* to 3*d.* per foot superficial. The slabs are secured with wood screws to wood studs, $3\frac{1}{2}$ in. × $2\frac{1}{2}$ in., and 3 ft. apart. The slabs are rebated, and the joints filled in with mortar. No foundations are required, only a plate about 6 in. × 2 in. on a cement bed about 9 in. × 9 in.

A pair of cottages, on the Scotch "butt and ben" plan, containing living room, with beds in recesses, bed room, loft over, scullery, pantry, &c., cost for materials, all prepared and delivered on the Thames, 150*l.* the pair; or, fixed, about 200*l.*

Fish scale tile slabs 2 ft. × 3 ft., and $1\frac{1}{4}$ in. thick	12*l.* 10*s.* per 100 or about 5*d.* per ft. super.
Plain slabs, ditto, ditto	10*l.* per 100, or about 4*d.* per ft. super.
Lining slabs, 2 ft. × 3 ft., and 1 in.	8*l.* 15*s* per 100, or about $3\frac{1}{2}$*d.* per ft. super.
Studs faced three sides, 8 ft. long, 4 in. × 4 in.	11*l.* 15*s.* per 100, or about $3\frac{1}{2}$*d.* per ft. run.

Marr and Black's Concrete.

Concrete flooring 100 yards and upwards—

Laid in Bradford	3*s.* 3*d*	per yd. super.	
" Leeds, Halifax, &c.	3*d.*	"	addl.
" Manchester, York, Sheffield, &c.	6*d.*	"	"
" Liverpool, Nottingham, &c.	9*d.*	"	"
" South of London	1*s.* 8*d.*	"	"
" London	4*s.* 7*d.* to 5*s.*	per yard super.	
Grooved for stables	3*d.*	"	extra.
Granite faced	3*d.*	"	"
Concrete sinks	1*s.* 2*d.*	per ft. super.	
" ridges	2*s.* 6*d.*	per yd. run.	
" garden edges	2*s.*	"	
" chimney pieces	from 7*s.* 6*d.*	each.	

BRICKLAYER.

(Memoranda of Bricklayers' Work. See page 19.)

TABLE SHOWING THE VALUE OF BRICKWORK PER ROD, ACCORDING TO THE PRICE OF BRICKS, &c.

Price of Bricks per Thousand.	Cost of Labour and Mortar per Rod.																				
	70s.			75s.			80s.			85s.			90s.			95s.			100s.		
s.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
22	8	9	0	8	14	0	8	19	0	9	4	0	9	9	0	9	14	0	9	19	0
23	8	13	6	8	18	6	9	3	6	9	8	6	9	13	6	9	18	6	10	3	6
24	8	18	0	9	3	0	9	8	0	9	13	0	9	18	0	10	3	0	10	8	0
25	9	2	6	9	7	6	9	12	6	9	17	6	10	2	6	10	7	6	10	12	6
26	9	7	0	9	12	0	9	17	0	10	2	0	10	7	0	10	12	0	10	17	0
27	9	11	6	9	16	6	10	1	6	10	6	6	10	11	6	10	16	6	11	1	6
28	9	16	0	10	1	0	10	6	0	10	11	0	10	16	0	11	1	0	11	6	0
29	10	0	6	10	5	6	10	10	6	10	15	6	11	0	6	11	5	6	11	10	6
30	10	5	0	10	10	0	10	15	0	11	0	0	11	5	0	11	10	0	11	15	0
31	10	9	6	10	14	6	10	19	6	11	4	6	11	9	6	11	14	6	11	19	6
32	10	14	0	10	19	0	11	4	0	11	9	0	11	14	0	11	19	0	12	4	0
33	10	18	6	10	3	6	11	8	6	11	13	6	11	18	6	12	3	6	12	8	6
34	11	3	0	11	8	0	11	13	0	11	18	0	12	3	0	12	8	0	12	13	0
35	11	7	6	11	12	6	11	17	6	12	2	6	12	7	6	12	12	6	12	17	6
36	11	12	0	11	17	0	12	2	0	12	7	0	12	12	0	12	17	0	13	2	0
37	11	16	6	12	1	6	12	6	6	12	11	6	12	16	6	13	1	6	13	6	6
38	12	1	0	12	6	0	12	11	0	12	16	0	13	1	0	13	6	0	13	11	0
39	12	5	6	12	10	6	12	15	6	13	0	6	13	5	6	13	10	6	13	15	6
40	12	10	0	12	15	0	13	0	0	13	5	0	13	10	0	13	15	0	14	0	0
42	12	19	0	13	4	0	13	9	0	13	14	0	13	19	0	14	4	0	14	9	0
44	13	8	0	13	13	0	13	18	0	14	3	0	14	8	0	14	13	0	14	18	0
46	13	17	0	14	2	0	14	7	0	14	12	0	14	17	0	15	2	0	15	7	0
48	14	6	0	14	11	0	14	16	0	15	1	0	15	6	0	15	11	0	15	16	0
50	14	15	0	15	0	0	15	5	0	15	10	0	15	15	0	16	0	0	16	5	0

A Table showing the Value per Foot of Reduced Brickwork, from £1 2*s.* 8*d.* to £17 per Rod.

Per Foot.	Per Rod.			Per Foot.	Per Rod.		
d.	£	*s.*	*d.*	*d.*	£	*s.*	*d.*
1	1	2	8	8¼	9	7	0
¼	1	8	4	½	9	12	8
½	1	14	0	¾	9	18	4
¾	1	19	8	9	10	4	0
2	2	5	4	¼	10	9	8
¼	2	11	0	½	10	15	4
½	2	16	8	¾	11	1	0
¾	3	2	4	10	11	6	8
3	3	8	0	¼	11	12	4
¼	3	13	8	½	11	18	0
½	3	19	4	¾	12	3	8
¾	4	5	0	11	12	9	4
4	4	10	8	¼	12	15	6
¼	4	16	4	½	13	0	8
½	5	2	0	¾	13	6	4
¾	5	7	8	12	13	12	0
5	5	13	4	¼	13	17	8
¼	5	19	0	½	14	3	4
½	6	4	8	¾	14	9	0
¾	6	10	4	13	14	14	8
6	6	16	0	¼	15	0	4
¼	7	1	8	½	15	6	0
½	7	7	4	¾	15	11	8
¾	7	13	0	14	15	17	4
7	7	18	0	¼	16	3	0
¼	8	4	4	½	16	8	8
½	8	10	0	¾	16	14	4
¾	8	15	8	15	17	0	0
8	9	1	4				

A TABLE SHOWING THE VALUE FROM 1 TO 272 FEET OF REDUCED BRICKWORK FROM £8 TO £16 PER ROD.

Feet.	At £8.			At £10.			At £12.			At £14.			At £16.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	7	0	0	8¾	0	0	10½	0	1	0¼	0	1	2
2	0	1	2	0	1	5½	0	1	9	0	2	0¾	0	2	3¾
3	0	1	9	0	2	2¼	0	2	7½	0	3	1	0	3	6½
4	0	2	4	0	2	11	0	3	6	0	4	1¼	0	4	8½
5	0	2	11	0	3	8	0	4	5	0	5	1¾	0	5	10½
6	0	3	6¼	0	4	5	0	5	3½	0	6	2	0	7	0½
7	0	4	1¼	0	5	1¾	0	6	2	0	7	2½	0	8	3
8	0	4	8½	0	5	10½	0	7	0½	0	8	2¾	0	9	5
9	0	5	3½	0	6	7¼	0	7	11¼	0	9	3¼	0	10	7¼
10	0	5	10½	0	7	4	0	8	9¾	0	10	3½	0	11	9
15	0	8	9¾	0	11	0¼	0	13	2¾	0	15	5¼	0	18	7¾
20	0	11	9	0	14	8½	0	17	7¾	1	0	7	1	3	6¼
25	0	14	8½	0	18	4½	1	0	0½	1	5	8¾	1	10	9
30	0	18	4½	1	2	0¾	1	6	5¾	1	10	10½	1	15	3¼
40	1	2	0¾	1	9	5	1	15	3½	2	1	2	2	7	0½
50	1	9	5	1	16	9	2	4	1¼	2	11	5½	2	16	9¾
60	1	15	3½	2	4	1¼	2	12	11¼	3	1	9¼	3	10	7
70	2	1	2	2	11	5½	3	1	9	3	12	0¾	4	2	4½
80	2	7	0½	2	18	9¾	3	10	7	4	2	4¼	4	13	1½
90	2	12	11¼	3	6	2	3	19	5	4	12	7¾	5	6	10½
100	2	18	9¾	3	13	6¼	4	8	2	5	2	11¼	5	17	8½
110	3	4	8¼	4	0	10½	4	17	0½	5	13	2¾	6	9	5
120	3	10	7	4	8	2¾	5	5	10½	6	3	6¼	7	1	2
130	3	16	5½	4	15	7	5	14	8½	6	13	9¾	7	12	11
140	4	2	4	5	2	11¼	6	3	6¼	7	4	1¼	8	4	8¼
150	4	8	2¾	5	10	3½	6	12	4	7	14	4¾	8	16	5½
160	4	14	1¼	5	17	7¾	7	1	2	8	4	8¼	9	8	2¼
170	5	5	0	6	5	0	7	10	0	8	15	0	10	0	0
180	5	5	10½	6	12	4	7	18	9¾	9	5	3½	10	11	8¾
190	5	11	9	6	19	8	8	7	7¾	9	15	7	11	3	6¼
200	5	17	7¾	7	7	0½	8	16	5½	10	5	10½	11	15	3½
210	6	3	6¼	7	14	5	9	5	3½	10	16	2	12	7	0¼
220	6	9	4¾	8	1	9	9	14	1¼	11	6	5½	12	18	9¾
230	6	15	3½	8	9	1¼	10	2	11¼	11	16	9	13	10	6¾
240	7	1	2	8	16	5½	10	11	9	12	7	0½	14	2	4
250	7	7	0½	9	3	9¾	11	0	7	12	17	4	14	14	1
260	7	12	11	9	11	2	11	9	5	13	7	7¾	15	5	10½
270	7	18	10	9	18	6	11	18	3	13	17	11¼	15	17	7½
272	8	0	0	10	0	0	12	0	0	14	0	0	16	0	0

At the present day the contract price of brickwork varies from £15 10s., according to the locality where the work is done. In the following prices the bricks are calculated at 45s. a thousand delivered; for every shilling more or less that the bricks cost, add or deduct 5s. per rod.

BRICKWORK IN MORTAR.

	Per Rod Reduced. All Materials and Labour.			Per Rod Reduced. Labour and Mortar.		
	£	s.	d.	£	s.	d.
Brickwork laid dry in wells ..	12	10	0	2	5	0
" (all stocks) in mortar in walls	15	15	0	5	5	0
" picked for outside work and jointed ..	16	10	0	5	10	0
" in garden walls, picked stocks and jointed both sides	16	15	0	5	15	0
If done with blue lias lime add ..	0	10	0	—		
" Portland cement add	2	15	0	—		

	Per Ft. Super. All Materials and Labour.		
	£	s.	d.
Circular work, flat sweep, add	0	0	1
" quick " "	0	0	1½
	per rod.		
Pulling down, cleaning, and stacking only ..	1	7	0
	per ft. super.		
Ovens, coppers, and other solid work, take the number of reduced feet in 1½ brickwork, at	0	1	4

Brick Nogging.

The quarters to be measured in.

	Per Yard Superficial.					
	In Mortar.			In Cement.		
	£	s.	d.	£	s.	d.
Place bricks, on edge..	0	2	8	0	3	4
" flat..	0	3	7	0	4	6
Stock bricks, on edge..	0	3	2	0	3	10
" flat..	0	4	4	0	5	1

Facings.

In addition to the price of stock bricks.

	Per Ft. Super.		
	£	s.	d.
Picked stocks	0	0	1½
Second malms	0	0	2½
Best "	0	0	4½
Red bricks	0	0	6
Suffolk white	0	0	6½

For facings add 1*d.* for every 10*s.* difference in value between hidden bricks and facings.

Arches (*Rough*).

Set in mortar for pointing. (Measure face and soffit.)

	Per Ft. Super.		
	£	s.	d.
Semi or Camber, axed (S.B.)	0	0	10
Gothic or Venetian, axed (S.B.)	0	1	6
If of second malms	0	1	10
White joint pointing, add	0	0	6
Tuck pointing "	0	0	9
If circular on plan "	0	1	4

Arches (*Gauged*).

	Per Foot Superficial.					
	All Materials and Labour.			Labour and Mortar.		
	£	s.	d.	£	s.	d.
Semi or Camber, with best malms or red bricks, set in putty ..	0	2	9	0	1	9
Ditto, elliptical or Tudor	0	3	6	0	2	1
Ditto, circular on plan	0	5	3		—	
Semi, upright of niches in best malms or red bricks	0	5	0		—	
Heads of ditto	0	9	0		—	

Pointing.

	Per Foot Superficial.					
				In Cement.		
	£	s.	d.	£	s.	d.
Flat joint, in blue ash mortar ..	0	0	3	0	0	3½
,, to chimney shafts ..	0	0	4	0	0	4½
Tuck pointing	0	0	3½		—	
White joint pointing	0	0	2½	0	0	3½
If scaffolding has to be erected, add	0	0	1		—	
Tuck pointing to old fronts, including scaffolding, raking out joints, washing and staining brickwork	0	0	6		—	
Brickwork cleaned, coloured, and drawn	0	0	2		—	

Brickwork in Roman Cement.

Equal parts of cement and sand.

	All Materials.			Labour and Cement.		
	£	s.	d.	£	s.	d.
All stocks per rod reduced ..	17	15	0	7	12	0
Half-brick walls, per foot super.	0	0	5	0	0	3
„ trimmers, „	0	0	6½		—	
One brick on edge, per foot run	0	0	5	0	0	3
1½ „ „ „	0	0	7	0	0	3½
12-inch tile coping, „	0	0	7½		—	
10 „ „ „	0	0	6½		—	
Rendering in cement from the trowel	0	0	2		—	

Sundries.

	All Materials.	
	s.	d.
Cutting to rakes, per foot super.	0	4
	per foot run.	
Squint quoins, per foot run	0	3
Bird's Mouth, „	0	3
Splays, „	0	2½
4-in. chase or indent, cut and pargetted ..	0	4
Points to groins of common stocks	0	6
„ malms	0	8
Double plain tile creasing in mortar	0	2½
„ „ cement	0	3½
Lime and hair filleting in mortar	0	2
„ „ cement..	0	2½
Making good to window sills, each	1	6
Hoop-iron bond tarred and sanded and laid in walls—		
	per yard run.	
No. 16, 1¼ inch wide, for every strip ..	0	2
„ 15, 1½ „ „ ..	0	2½
Tyreman's patent (notched)—		
No. 16, 1¼ inch wide, „ ..		
„ 15, 1½ „ „ ..		

Paving.

	Per Yard Superficial.		
	In Sand.	In Mortar.	In Cement.
	s. d.	s. d.	s. d.
Common stock bricks, flat ..	2 10	3 6	4 0
„ „ on edge	3 10	4 6	5 2
Malm paviors, flat..	3 8	4 4	5 0
„ on edge	5 0	5 8	6 6
Paving bricks, flat..	3 6	4 2	5 0
„ on edge	5 6	6 2	7 2
„ herring-bone, add	0 3	0 3	0 3
10-inch tiles	—	4 6	5 6
12 „ „	—	5 0	6 0
If rubbed and faced to close joint .. .. add	—	2 0	2 0
Dutch clinkers	11 6	—	—
„ laid herring-bone	12 6	—	—

Encaustic Tiles.

A solid bottom of fine concrete and cement should be prepared for tiles, leaving $\frac{5}{8}$ of an inch for tiles $\frac{1}{2}$ in. thick, and $\frac{7}{8}$ of an inch for tiles $\frac{3}{4}$ in. thick.

	Per Yard Super.
Tile pavement laid complete—	s. d.
Red, buff, black, and white	14 3
Buff and black ditto	11 10
Buff octagon, black, red, and white ditto	15 4
Red and buff ditto	12 4
Red, with glazed black bands.. about	19 0

Country prices about 2s. per yard extra.

Tiles only.

	s. d.
Red, black, chocolate, grey, ½ in. thick per yd.	5 6
Ditto, ¾ in. thick .. .. „	8 6
Ditto, with buff, cream, or fawn, ½ in. thick „	7 6
Tesseræ, 1 in. × 1 in. to ½ in. × ½ in. extra	4 0
White glazed wall tiles, 6 in. × 6 in. per 100	23 0
Ditto, fixed .. .. per yard	12 6
Glazed hearth tiles .. .. „	24s. to 50s.
Modelling new designs for tiles, 6 in. × 6 in. per mould	15 0

French Tiles.

Glazed—suitable for Walls.

		Francs.
Aubagne (near Marseilles), blue and white ornamental, 6 in. × 6 in. ..	per 100	15
Ditto, diaper	„	13
Calais, blue and white, 4½ in. × 4½ in. ..	„	12
„ French blue, 5 in. × 5 in.	„	13
„ white, 6 in. × 6 in.	„	15
„ dull red, 6 in. × 6 in.	„	3
„ brown, red, yellow, and green, 9½ in. × 9½ in.	„	16
Naples, blue and white Persian pattern, per mètre super.		16 to 20

Mosaics.

	Per Foot Sup. s. d.
Plain white	2 6
„ with black rings and border ..	4 0
„ with leaf in black, and border ..	5 0
„ with black lines in squares, and leaf in centre, and border	5 6

Chimney Pots, and Setting in Cement.		s.	d.
Large size		6	3
Second ,,		5	3
Third ,,		4	3
24-inch compo		5	0
18 ,, ,,		4	0
Terra-cotta pots, from 5s. to 10s.			
Ornamental Gothic pots, £3 to £5.			
Day Work—Bricks.		per 100.	
Place		4	6
Grey stocks		5	0
Red ,,		6	0
Second malms		9	0
Cutters		11	6
Red rubbers		8	0
Coping, 9 in.		8	0
Paving bricks		8	0
Dutch clinkers		5	6
Adamantine clinkers		4	6
Terro-metallic ,,		6	6
Grooved paviors, 4 × 4 × 2½		9	0
,, 9 × 3 × 3½		14	6
Air bricks, 9 × 2¾		30	0
Windsor fire-bricks		12	0
Stourbridge ,,		12	6
Newcastle ,,		12	0
Lime.			
Chalk lime by the yard or hundred		13	0
,, per bushel		1	0
Stone lime by the hundred		16	0
,, per bushel		1	2
Blue lias, per yard		24	0
Cement.	P.C.		
Portland, per bushel	2 0	2	6
Roman, ,,	..	1	10
Keens, ,,	3 0	3	9
Parian, ,,	3 3	4	3

DAY WORK—*continued.*

Mortar.	s.	d.
Per load	19	0
Per hod	0	7
Lime and hair, per load	25	0
„ per hod	0	10
Pargetting, „	0	9
Fine stuff, „	1	2
White pointing, „	1	9
Blue or red, „	1	2

		s.	d.
Hair, per bushel		1	3
Sand, per cubic yard		6	6
Ballast (Thames) per cubic yard		6	0
Ashes, per bushel		0	9
Limewhite, per pail		0	6
Coloured ditto „		0	10
4-in. stoneware drain pipes, per foot	including laying	0	7
6 „ „ „	including laying	0	9
9 „ „ „	including laying	1	4
12 „ „ „	including laying	2	9

CEMENT, PRIME COST AT WORKS.

		s.	d.
Portland Cement, No. 1	per ton	50	0
Ditto ditto „ 2	„	42	6
Roman Cement	„	42	6
Lias Cement	„	30	0
Blue Lias Lime, Lump	„	15	0
Ditto Ground	„	18	4
Dorking Grey Stone Lime, per yard of 36 bushels, at London Depôt		11	0
Ditto, Ground		12	0
Selenetic Cement	per ton	28	0

Fire Lumps and Tiles.

	Welsh.		Stourbridge.	
	s.	d.	s.	d.
Single bricks	0	2	0	2½
9-in. tiles .. ..each	0	7	1	7
12 „ .. .. „	1	0	1	9
18 „ .. .. „	2	10	4	6
24 „ .. .. „	6	0	8	6
16-in. lumps .. .. „	1	7	3	2
20 „ .. .. „	2	4	4	0
24 „ .. .. „	3	10	5	4
30 „ .. .. „	5	3	7	2
36 „ .. .. „	6	9	9	8

Bricks, Prime Cost at London Depôts.

		s.	d.
Moulded Gault Bricks, chamfered, bull-nose, and quadrant	per 1000	69	0
Cavetto—bead, ogee, ovolo and fillet, bird's mouth, saddle back, and label mould	„	73	0
		£	s.
Pether's ornamental bricks for strings and surfaces	„	6	6
„ for arches (special radiated) ..	„	7	7
„ „ columns „ ..	„	7	7
Red, extra	„	0	10
Berkhampstead Red Moulded Brick, at Brickyard,			
Splays, &c. .. .., ..	per 100	7	0
Ovolos, &c.	„	8s. to 10s.	
Ornamental	„	10s to 15s.	
Mullions and Jambs	„	13	0
Moulded Coping	„	20	0
For Ornamental Chimneys..	„	15	0

PRIME COST OF MATERIALS,
Exclusive of Carriage and Fixing.

	s. d.
Air Bricks, in stoneware or terra-cotta.	
9 in. × 3 in. .. .. each	0 4
9 in. × 6 in. .. .. ,,	1 0
Terra-cotta Flue Pipes, whole sockets, and with sides cut off.	
9 in. bore .. .. per foot	1 2
10 in. ,, ... ,,	1 6
12 in. ,, ... ,,	1 10
Butt Joints, 9 in. bore .. .. .. ,,	1 1
,, ,, 10 in. ,, ... ,,	1 5
,, ,, 12 in. ,, ... ,,	1 8
Patent Stoneware Damp-proof Course, made in 9 in. lengths.	
3 in. thick, for 4½ in. wall .. per foot run	0 3½
,, ,, ,, 9 in. ,, .. ,,	0 6¾
,, ,, ,, 13½ in. ,, .. ,,	0 10¼
,, ,, ,, 18 in. ,, .. ,,	1 1½
1½ in. ,, ,, 4½ in. ,, .. ,,	0 2¼
,, ,, ,, 9 in. ,, .. ,,	0 4½
,, ,, ,, 13½ in. ,, .. ,,	0 6¼
,, ,, ,, 18 in. ,, .. ,,	0 9
Stoneware Sinks, white glazed.	
20 in. long × 15 in. wide .. .. .. each	6 0
22½ in. ,, × 16 in. ,, ... ,,	7 0
26 in. ,, × 18 in. ,, ... ,,	8 0
30 in. ,, × 20 in. ,, ... ,,	10 0
36 in. ,, × 22 in. ,, ... ,,	15 0
Sussex Red Bricks and Terra-cotta, prime cost on trucks at Burgess Hill.	
Red Bricks .. .. per 1000	42 6
,, Rubbers .. .. ,,	75 0
,, Moulded .. .. ,,	50/to 80/
Crested Ridge Tiles, black, red, or white, each	6*d.* to 1*s.*
Terra-cotta, Diaper, 9 × 9 × 3 .. .. ,,	1 0
,, String, 12 × 9 × 6 .. per foot	1 6
,, Copings, 1 ft. 6 in. long, for 9 in. walls .. .. each	2 0

Bricks, at Prime Cost.

	s.	d.
Delivered into carts at their London Depôts.		
Moulded Bricks, chamfered, ogee, &c.—		
White.. .. .. per 1000	105	0
Red .. .. ,,	90	0
Blue .. .. ,,	120	0
Angles .. .. each	0	2
Bricks, No. 1, Pressed Gault (Facing) per 1000	63	0
,, No. 2 ,, ,, (Mingled) ,,	57	0
,, No. 3 ,, ,, (Paviors) ,,	63	0
,, No. 1, Wire Cut ,, (Facing) ,,	57	0
,, No. 2 ,, ,, (as they rise from Kiln) ,,	—	
,, No. 3, Wire Cut Gault (Mingled) ,,	47	0
Lime, Ground Hydraulic .. .. .. per yd.	—	
,, Grey Stone .. .. ,,	10	6
,, Chalk Flare .. .. ,,	10	6
Cement, Portland.. .. per bush. of 100 lbs.	2	0
,, Sheppy .. .. ,,	1	11
,, Roman .. .. ,,	1	2
If delivered by Van within a radius of three miles, or to any Railway Station in London, Bricks, 6*s*. per 1000; Lime, 1*s*. per yard; Cement, 1*d*. per bushel extra.		
Delivered by Barge-load alongside in the Thames, below Battersea Bridge.		
Bricks, No. 1, Pressed Gault (Facing) per 1000	58	0
,, No. 2 ,, ,, (Mingled) ,,	52	0
,, No. 3 ,, ,, (Paviors) ,,	58	0
,, No. 1, Wire Cut ,, (Facing) ,,	52	0
,, No. 2 ,, ,, (as they rise from Kiln) ,,	—	
,, No. 3, Wire Cut Gault (Mingled) ,,	42	0

London Wharf Prices.

Description.		Size.	General Weight.			Price.		
		in. in. in.	cwt.	qrs.	lbs.	£	s.	d.
Common Blue Brick	per 1000	$9 \times 4\frac{1}{2} \times 3$	75	0	0	5	5	0
Ditto, ditto, Dressed	"	$9 \times 4\frac{1}{2} \times 3$	72	0	0	5	19	0
Pressed Facing	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	66	0	0	6	0	0
Pressed and Dressed Facing	"	$9 \times 4\frac{1}{2} \times 3$	66	0	0	6	10	0
Plinth Header; Plinth Stretcher; Hollow Moulding for Cornice; Thumb; $2\frac{1}{4}$ in. Round Nose ..	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	65	0	0	6	15	0
$2\frac{1}{4}$ in. Round Nose, for Platform Coping	"	$10 \times 5 \times 3$	105	0	0	8	10	0
$4\frac{1}{2}$ in. Quadrant		$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	63	0	0	6	15	0
Beaded or Torus	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	65	0	0	7	10	0
Cornice Moulding	"	$9 \times 4\frac{1}{2} \times 3$	65	0	0	7	5	0
$2\frac{1}{4}$ in. Plinth Header	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	65	0	0	6	15	0
$2\frac{1}{2}$ in. External Plinth Angle	each	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$		..		0	0	3
Radiated and Beaded Window Arch	"	$14 \times 4\frac{1}{2} \times 3$	0	0	15	0	1	0
$2\frac{1}{4}$ in. Internal Plinth Angle	"	$9 \times 9 \times 2\frac{3}{4}$	0	0	16	0	0	6
$3\frac{1}{4}$ in. ditto	per 1000	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	65	0	0	7	10	0
Beaded Moulding..	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	65	0	0	7	5	0
Arch, Sewer, or Culvert	"	$9 \times 4\frac{1}{2} \times 3$	63	0	0	5	15	0
Circular for Wells and Chimney Shafts	"	$9 \times 4\frac{1}{2} \times 3$	75	0	0	6	0	0
Ditto, ditto, Dressed	"	$9 \times 4\frac{1}{2} \times 2\frac{3}{4}$	66	0	0	6	10	0

LONDON WHARF PRICES—*continued.*

Description.		Size.	General Weight.			Price.		
		in. in. in.	cwts.	qrs.	lbs.	£	s.	d.
Improved Vitrified Drip Course ..	each	12 × 5 × 4½	0	0	20	0	0	10
Corbel or Cornice Moulding	"	14 × 6 × 3½	0	0	21	0	0	10
Half-round Coping for 9 in. Walls ..	per 1000	9 × 4½ × 3	63	0	0	7	5	0
Ditto for 4½ in. Wall	"	4½ × 9 × 4½	63	0	0	7	5	0
Ditto for 9 in. Wall (with drip) ..	"	10½ × 4½ × 3	105	0	0	8	0	0
Ditto for 14 in. Wall (with drip) ..	each	14 × 6 × 6	0	1	2	0	0	9
Ditto for 18 in. Wall (with drip) ..	"	18 × 6 × 6	0	1	12	0	1	2
Curb Brick or Platform Coping ..	per 1000	10 × 5 × 3	105	0	0	8	10	0
Ditto, ditto	"	12 × 5 × 3	130	0	0	10	0	0
Ditto, ditto	each	14 × 6 × 6	0	1	10	0	0	9
Ditto, ditto	"	18 × 6 × 6	0	1	20	0	1	2
Railway Coping	"	14 × 6 × 6	0	1	8	0	0	9
Ditto	"	18 × 6 × 6	0	1	18	0	1	2
Saddle Back or Sharp Top Coping for 9 in. Wall	per 1000	9 × 4½ × 3	56	0	0	6	15	0
Ditto for 4½ in. Wall	"	4½ × 9 × 4½	56	0	0	6	15	0
Ditto for 9 in. Wall (with drip) ..	"	11½ × 6 × 4	110	0	0	8	0	0
Ditto for 9 in. Wall (with drip) ..	each	12 × 12 × 4	0	1	0	0	0	9
Ditto for 14 in. Wall (with drip) ..	"	14 × 7 × 6	0	1	5	0	0	9
Barn-floor Brick, and for Suburban footpaths	per 1000	9 × 4½ × 1¾	50	0	0	5	5	0

LONDON WHARF PRICES—*continued.*

Description.		Size.	General Weight.			Price.		
		in. in. in.	cwts.	qrs.	lbs	£	s.	d.
Barn-floor Brick, and for Suburban footpaths	per 1000	10 × 5 × 2	70	0	0	6	5	0
Ditto, ditto	„	10 × 5 × $2\frac{1}{2}$	87	0	0	6	10	0
Ditto, ditto	„	12 × 6 × 2	110	0	0	9	0	0
Ditto, ditto	„	12 × 6 × $2\frac{1}{2}$	130	0	0	10	0	0
Grooved and Channelled Stable Paving	„	9 × $4\frac{1}{2}$ × $2\frac{1}{2}$	63	0	0	6	0	0
Ditto, ditto	„	9 × $4\frac{1}{2}$ × $2\frac{3}{4}$	72	0	0	6	10	0
Ditto, ditto	„	9 × $4\frac{1}{2}$ × 3	80	0	0	6	15	0
Plain Adamantine Stable Clinker ..	„	6 × $2\frac{1}{2}$ × $1\frac{3}{4}$	18	0	0	2	0	0
Channel ditto	„	9 × $4\frac{1}{2}$ × 3	70	0	0	7	0	0
Ditto, ditto	each	12 × 5 × 3		..		0	0	5
Ditto, ditto	„	12 × 7 × $3\frac{1}{2}$		..		0	0	6
Ditto, ditto	„	12 × 9 × $4\frac{1}{2}$		..		0	0	9
Ditto, ditto	„	12 × 12 × 4		..		0	1	0
External Angle Saddle Back Coping	„	9 × 9 × 6		..		0	1	6
External Angle Half-round Coping ..	„	9 × 9 × $4\frac{1}{2}$		..		0	1	6
Ditto, ditto	„	14 × 14 × 6		..		0	3	0
Knotted Surface for footpaths	per 1000	10 × 5 × 2	50	0	0	6	10	0
Chamfered Adamantine	„	6 × $2\frac{1}{2}$ × $1\frac{3}{4}$	18	0	0	2	3	0
$2\frac{1}{2}$ Beaded Garden Edging	per 100	12 × $7\frac{1}{2}$ × 1	6	0	0	0	17	0
Gothic Garden Edging	„	9 × 7 × 1	3	0	0	0	19	6

LONDON WHARF PRICES—*continued.*

Description.		Size.	General Weight.			Price.		
		in. in. in.	cwts.	qrs.	lbs.	£	s.	d.
Cable Garden Edging	per 100	9 × 7 × 1	3	0	0	1	0	0
Double Chamfered Wall Coping ..	per 1000	9 × 4½ × 3	70	0	0	6	10	0
4½ in. Cube, Grooved and Channelled (for Carriage Crossings)	”	4½ × 4½ × 3¼	48	0	0	5	0	0
5½ in. ditto, ditto	”	5½ × 5½ × 4	67	0	0	5	15	0
9 in. ditto, ditto (for Street Crossings)	each	9 × 9 × 4½	0	1	0	0	0	9
Channelled and Grooved Stable Paving	per 1000	9 × 3½ × 3	60	0	0	5	15	0
Diamond Paving for Railway Platforms and Suburban Footpaths	”	10 × 5 × 2	70	0	0	6	10	0
Ditto, ditto	”	10 × 5 × 2½	87	0	0	7	10	0
Ditto, ditto	”	12 × 6 × 2	107	0	0	10	5	0
Ditto, ditto	”	12 × 6 × 2½	127	0	0	12	10	0
Channel Brick, Grooved for Stables ..	”	9 × 4½ × 3	70	0	0	7	0	0
8 in. Square Chamfered Stable Paving	”	9 × 4½ × 2½	63	0	0	6	0	0
Ditto, ditto	”	9 × 4½ × 2¾	78	0	0	6	10	0
Ditto, ditto	”	9 × 4½ × 3	84	0	0	6	15	0
Scollop Garden Edging	per 100	9 × 7 × 1	2	2	0	0	17	0
Ditto, ditto, Pressed	”	9 × 7 × 1	2	2	2	0	19	6
O. G. ditto	”	7½ × 7½ × 1	2	1	7	0	9	6
Ditto, ditto, Pressed	”	7½ × 7½ × 1	2	1	8	0	10	6

LONDON WHARF PRICES—*continued.*

Description.		Size.			General Weight.			Price.		
		in.	in.	in.	cwts.	qrs.	lbs.	£	s.	d.
Ornament for Ridge Tile	per Tile		..		..			0	1	0
Ditto, ditto	,,		..		..			0	1	0
Spiked Ridge Tile (any pitch)	each	18 in. long			0	0	14	0	1	11
Plain ditto, ditto	,,	18	,,		0	0	10	0	0	7
Roll ditto, ditto	,,	18	,,		0	0	12	0	0	11
Lapped ditto, ditto	,,	18	,,		0	0	13	0	0	9
Gothic ditto, ditto (with ornament)..	,,	18	,,		0	0	16	0	1	11
Ornament for ditto, ditto			..		..				..	
Ditto, ditto			..		..				..	
Hip Tiles for Roofing	each		..		0	0	4	0	0	6
Plain Roofing Tiles, Red	per 1000	$10\frac{1}{2}$ ×	$6\frac{1}{2}$		25	0	0	3	10	0
Ditto, ditto, Blue	,,	$10\frac{1}{2}$ ×	$6\frac{1}{2}$		25	0	0	3	5	0
Ornamental ditto, Red	,,	$10\frac{1}{2}$ ×	$6\frac{1}{2}$		24	0	0	3	12	0
Ditto, ditto, Blue	,,	$10\frac{1}{2}$ ×	$6\frac{1}{2}$		24	0	0	3	7	6
Valley Tiles for Roofing	each		..		0	0	4	0	0	6
Blue and Red Flooring Tile, Good ..	per 1000	6 ×	6 ×	1	22	0	0	5	5	0
Buff ditto	,,	6 ×	6 ×	1	24	0	0	5	10	0
Best Pressed Red and Buff ..	,,	6 ×	6 ×	1	22	2	0	7	10	0
Ditto Black	,,	6 ×	6 ×	1	22	2	0	9	10	0
Red, Blue, and Buff	,,	9 ×	9 ×	$1\frac{1}{4}$	60	0	0	9	10	0

STAFFORDSHIRE BLUE BRICKS AND TILES, prime cost at Works.

Description.	Size.	Approximate Weight.	Price.
BUILDING BRICKS.	Length Width Thick.	cwt. qrs. lbs.	s. d.
Best Pressed Blue Bricks ..	9 by $4\frac{1}{2}$ by 3	79 0 0 per M.	62 6 per M.
Common Blue Bricks	9 by $4\frac{1}{2}$ by 3	77 2 0 „	45 0 „
Stretcher Plinths	9 by $4\frac{1}{4}$ by 3	75 2 0 „	70 0 „
Header ditto	9 by $4\frac{1}{2}$ by 3	77 2 0 „	70 0 „
External Plinth Angle	9 by $4\frac{1}{2}$ by 3	.. ..	1 6 per doz.
PAVING, for Floors, Yards, Footpaths, Carriage-roads, Stables, &c., &c.			
Blue and Red Quarries	6 inch	26 0 0 „	52 6 per M.
Ditto Ditto	9 inch	78 0 0 „	100 0 „
Plain Blue Pavings	12 by 6 by 2	107 0 0 „	112 6 „
Diamond Blue Pavings	12 by 6 by 2	107 0 0 „	115 6 „
Squares Blue Paving	12 by 6 by $2\frac{1}{2}$	107 0 0 „	135 0 „
Stable Bricks	9 by $4\frac{1}{2}$ by 3	75 0 0 „	65 0 „
Clinkers for Stables..	6 by $2\frac{1}{2}$ by $1\frac{3}{4}$	22 0 0 „	35 0 „
Kerbing	.. ..	.. ..	60 0 „
COPINGS FOR WALLS.			
Ridge Copings, 9 in. workway	$4\frac{1}{2}$ inch wide	83 1 0 „	75 0 „
Stop Ends to ditto	.. ..	.. ..	0 7 each.
Angles to ditto	.. ..	.. ..	0 7 „
WINDOW-SILL BRICKS.			
Window-Sill Bricks..	12 by $8\frac{1}{2}$ by 4 thick	3 0 0 per doz.	4 6 per doz.

STAFFORDSHIRE BLUE BRICKS AND TILES—*continued.*

Description.	Size.	Approximate Weight.	Price.
CORNICES AND MOULDED BRICKS.	Length Width Thick.	cwt. qrs. lbs.	s. d.
Cornices	14 by 6 by 3	2 0 0 per M.	3 6 per doz.
Cornice Brick	14 by 6 by 3	2 0 0 ,,	4 0 ,,
Cornices	9 by $4\frac{1}{2}$ by 3	70 0 0 per doz.	70 0 per M.
Cornice Brick	9 by $4\frac{1}{2}$ by 3	70 0 0 ,,	75 0 ,,
Moulded Plinths (Stretchers)..	9 by $4\frac{1}{2}$ by 3	75 0 0 per M.	70 0 ,,
Ditto ditto (Headers) ..	9 by $4\frac{1}{2}$ by 3	77 0 0 ,,	70 0 ,,
Angles to ditto	9 by $4\frac{1}{2}$ by 3	.. ..	1 6 per doz.
KERBING FOR FOOTPATHS, O.G.			
GARDEN TILES.			
Garden Tiles	7 inches long	22 0 0 ,,	80 0 per M.
Ditto, Cable Pattern	9 inches long	52 0 0 ,,	100 0 ,,
ROOFING TILES.			
Plain and Ornamental Roofing Tiles (500 cover a square)	$10\frac{1}{2}$ by $6\frac{1}{2}$	28 0 0 ,,	45 0 ,,
Hip Tiles	.. ..	0 2 4 per doz.	4 0 per doz.
Valley Tiles	.. ..	0 1 20 ,,	4 0 ,,
RIDGES.			
Plain Ridge Tiles	18 inches long	0 0 $19\frac{1}{2}$ each	5 0 ,,
Roll ditto	,,	0 0 25 ,,	9 0 ,,
Lap ditto	,,	0 0 $19\frac{1}{2}$,,	6 6 ,,
Vertical Pyramids ditto	,,	0 0 20 ,,	15 0 ,,
Grooved Ridge Tiles, Ornaments included	,,	0 0 32 ,,	16 0 ,,

STOURBRIDGE FIRE.

		s.	d.
Lumps,	12 in. × 9 in. × 4 in. .. .. each	1	3
,,	14 in. × 9 in. × 4½ in. .. .. ,,	1	5
,,	16 in. × 9 in. × 4½ in. .. .. ,,	1	8
,,	18 in. × 9 in. × 4½ in. .. .. ,,	1	10
,,	20 in. × 9 in. × 4½ in. .. .. ,,	2	5
,,	24 in. × 10 in. × 4½ in. .. .. ,,	3	4
,,	26 in. × 10 in. × 4½ in. .. .. ,,	3	9
,,	28 in. × 10 in. × 4½ in. .. .. ,,	4	3
,,	30 in. × 10 in. × 5 in. .. .. ,,	5	5
,,	36 in. × 10 in. × 5 in. .. .. ,,	6	7
Tiles ..	9 in. × 9 in. × 2 in. .. .. ,,	0	5
,,	10 in. × 10 in. × 2 in. .. .. ,,	0	7
,,	12 in. × 12 in. × 2 in. .. .. ,,	0	11
,,	12 in. × 12 in. × 3 in. .. .. ,,	1	2
,,	14 in. × 14 in. × 2½ in. .. .. ,,	1	5
,,	16 in. × 16 in. × 2½ in. .. .. ,,	2	2
,,	18 in. × 18 in. × 2¾ in. .. .. ,,	2	9
,,	20 in. × 20 in. × 2¾ in. .. .. ,,	3	4
,,	22 in. × 22 in. × 3 in. .. .. ,,	4	3
,,	24 in. × 24 in. × 3 in. .. .. ,,	5	2
Slabs ..	16 in. × 12 in. × 2 in. .. .. ,,	1	3
,,	18 in. × 12 in. × 2 in. .. .. ,,	1	6
,,	18 in. × 12 in. × 3 in. .. .. ,,	2	1
,,	20 in. × 12 in. × 2 in. .. .. ,,	1	10
,,	20 in. × 12 in. × 3 in. .. .. ,,	2	9
,,	24 in. × 12 in. × 2 in. .. .. ,,	2	5
,,	24 in. × 12 in. × 3 in. .. .. ,,	3	0
,,	24 in. × 18 in. × 3 in. .. .. ,,	4	6
,,	30 in. × 12 in. × 3 in. .. .. ,,	4	3
,,	30 in. × 16 in. × 3 in. .. .. ,,	5	5
,,	36 in. × 12 in. × 3 in. .. .. ,,	5	5

Patent Fire-brick Beehive Backs, for Smoky Chimneys.

	s.	d.		s.	d.
12 in. opening, each	7	3	20 in. opening, each	15	0
14 ,, ,,	9	0	22 ,, ,,	18	0
16 ,, ,,	10	3	24 ,, ,,	21	8
18 ,, ,,	12	0			

Fire-brick Stove Backs, for Sham Registers,

8 in. backs .. each	3	0	14 in. back .. each	6	0
10 ,, .. ,,	3	9	16 ,, .. ,,	7	3
12 ,, .. ,,	4	10			

Fire Bricks, 110s. per 1000.

MASON.

PORTLAND, BATH,* AND CAEN STONE.

	Per Foot Cube.			
	Portland.		Bath and Caen.	
	s.	d.	s.	d.
In block at wharf	2	10	1	8
,, ,, including cartage within five miles, and waste	3	6	2	9
,, ,, including hoisting scaffolding and setting	4	3	3	0
In block, if above 6 ft. long .. add	0	6	0	4
,, if hoisted above 30 ft., for every 10 ft. in height .. .. add	0	2	0	2
Labour, in addition to the price of Stone and Setting.	per ft. sup.			
Sawing	0	7	0	3
Plain work to beds and joints, one face measured for two	1	0	0	7
Plain work to beds of bond stones ..	0	11	0	6
,, to rubbed or combed face	1	4	0	8
,, ,, ,, ,, (circular)	1	8	0	11
Plain work (sunk work)	1	9	1	0
,, ,, (circular) ..	2	0	1	1
,, ,, (rubbed) ..	1	11	1	1
Moulded work	2	4	1	2
,, (stopped)	2	10	1	4
,, (circular)	3	0	1	8
,, (Gothic)	3	6	1	10
,, (Gothic, circular) ..	4	2	2	1
Columns (circular plain work to shafts)	2	0	1	1

* Bath stone is sometimes approximately priced at 4*s.* 6*d.* to 4*s.* 9*d.* per foot cube for all materials and labour in ordinary work, such as sills, heads, quoins, jambs, weatherings, &c. Portland in a similar manner, at 8*s.* to 9*s.*

PORTLAND, BATH, AND CAEN STONE—*continued.*

	Per Foot Super.	
	Portland.	Bath and Caen.
	s. d.	s. d.
Columns (circular moulded work to caps and bases)	2 10	1 7
Ashlar, 4 in. thick, including beds, joints, and face	3 6	1 9
Ashlar, for every additional inch in thickness .. .. add	0 6½	0 4½
Ashlar, if with bond stones, average 7 ft. apart, and each containing 24 in. cube .. .. add	1 8	1 0½
Slabs, jambs, mantles, or shelves, 1 in. thick	1 8	1 3½
Slabs, jambs, mantles, or shelves, 1½ in. thick	1 11	1 5
Slabs, jambs, mantles, or shelves, 2 in. thick	2 3	1 7
Slabs, jambs, mantles, or shelves, 2½ in. thick	2 7	1 9
Slabs, jambs, mantles, or shelves, 3 in. thick	2 11	1 11
Paving, rubbed, in straight courses, 1½ in. thick	1 10	1 2½
Paving, rubbed. For every ½ in. extra thickness .. .. add	0 3	0 2
Paving, rubbed. If in 2-ft. squares, laid diagonal .. .. add	0 5	0 4
Old paving taken up, squared, and re-laid	0 4½	0 4½
Old paving taken up, squared, and sanded	0 7	0 7
Old paving taken up, squared, and set in cement	0 9	0 9
Landings, plain face both sides, set complete, 3 in. thick	3 1	2 1
Landings. For every ½ in. extra thickness .. .. add	0 4	0 3

PORTLAND, BATH, AND CAEN STONE—*continued.*

	Per Foot Super.	
	Portland.	Bath and Caen.
	s. d.	s. d.
Landings. If more than 6 ft. long add	0 4	0 3
Sinks, 5 in. thick	4 6	3 0
" 6 "	5 6	3 9
Sinks. For every additional inch in thickness .. .. add	1 0	0 6
	per ft. run.	
Window sills, weathered and throated, 8 in. × 3 in.	3 0	2 0
Window sills, weathered and throated, 8 in. × 4 in.	4 0	2 9
Window sills. For every ½ in. extra thickness	0 6	0 4
Coping, throated and set, 12 in. × 2½ in.	2 9	1 10
" " " 18 in. × 2½ in.	3 6	2 7
" squared and reset, 12 in. ..	0 7	0 7
Curbs, including joints and setting, 6 in. × 6 in.	3 0	2 0
Curbs, including joints and setting, 7 in. × 6 in.	3 3	2 2
Curbs, including joints and setting, 8 in. × 6 in.	3 6	2 4
Curbs. If with circular top .. add	0 4	0 3
Joggling, sunk to 3-in. and 4-in. landings, in cement	1 4	1 0
Joggling, sunk to 3-in. and 4-in. landings, run with lead	1 8	1 4
Joggling, sunk to 5-in. and 6-in. landings, in cement	1 10	1 4
Joggling, sunk to 5-in. and 6-in. landings, run with lead	2 3	1 10
Cutting and pinning to steps, landings, &c., in cement	1 2	1 2
Throating or chamfer	0 2	0 1
Back joint	0 2	0 1

PORTLAND, BATH, AND CAEN STONE—*continued.*

	Per Foot Run.			
	Portland.		Bath and Caen.	
	s.	d.	s.	d.
Sunk rebates, 2 in. × $\frac{3}{4}$ in.	0	4	0	2
„ rustics, 2 in. deep	0	6	0	3
1-in. bead	0	3	0	$1\frac{1}{2}$
$\frac{1}{2}$-in. flutes or reeds	0	$2\frac{1}{4}$	0	$1\frac{1}{2}$
1-in. „ „	0	3	0	$2\frac{1}{2}$
$1\frac{1}{2}$-in. flutes to columns	0	4	0	3
Double-reeded edges	0	4	0	3
	each.			
1-in. holes for rails	0	2	0	1
3-in. „ „	0	4	0	3
Chimney-cramps	0	4	0	3
„ „ run with lead ..	0	7	0	5
Notches to slabs	0	$5\frac{1}{2}$	0	3
Pipe-holes to sinks	0	9	0	6
Washers let in sinks	0	9	0	6
6-in. traps „ „	1	6	1	2
1-in. iron plugs, run with lead	0	6	0	5
Sunk letters, per inch	0	$1\frac{1}{4}$	0	1

YORKSHIRE STONE.

	Per ft. cub.	
	s.	d.
In blocks, including hoisting and setting ..	4	3
„ if above 6 ft. long .. .. .. add	0	5
Labour.	per ft. sup.	
Plain work, including sawing	1	4
„ „ „ (circular)	1	11
„ sunk	2	0
„ „ (circular)	2	3

YORKSHIRE STONE. (*Labour*)—*continued.*

	Per ft. sup. s. d.
Moulded work	2 8
" (circular)	3 2
If rubbed .. .. add	0 5
Materials and Labour.	
Paving, laid in straight courses, 2 in. thick ..	0 10
" " " " 2½ in. " ..	1 0
" " " " 3 in. " ..	1 2
" " " " 4 in. " ..	1 4
" " " " if rubbed add	0 4
Paving, laid in straight courses. If set in cement .. .. add	0 2
Old paving taken up, squared, and relaid ..	0 3
2½-in. rubbed hearths	1 6
Landings, including setting, 3 in. thick, tooled	3 0
" " " 4 in. " "	3 3
" " " 5 in. " "	3 6
" if rubbed .. .. add	0 4
" if more than 5 ft. long .. .. add	0 3
Sinks, 6 in. thick	3 9
Joggle joints to 3-in. landings .. per ft. run	1 7
" to 4-in. " .. "	1 11
" to 5-in. " .. "	1 10
" to 6-in. " .. "	2 0
" if run with lead .. .. .. add	0 4
Quarry-worked Materials.	
Coping, 12 in. × 2 in., throated .. per ft. sup.	1 10
" 12 in. × 3 in. " .. "	2 3
" 18 in. × 2 in. " .. "	2 6
" 18 in. × 3 in. " .. "	3 3
Window sills, weathered and throated, 7 in. × 2½ in. .. .. per ft. run	1 6
Window sills, weathered and throated, 8 in. × 3 in. .. .. "	1 11
Window sills, weathered and throated, 8 in. × 4½ in. .. .. "	2 4

YORKSHIRE STONE (*Quarry-worked Materials*)—*continued.*

	Per ft. run. s.	d.
Solid steps, 9 in. × 6 in.	3	0
„ 12 in. × 6 in.	3	4
Curb, 4 in. × 6 in.	2	1
„ 6 in. × 6 in.	2	6
„ 8 in. × 6 in.	2	10
„ 9 in. × 6 in.	3	3
	each.	
Drain stone, dished	3	6
Five-hole sink stones	2	4
Throat	0	2
Holes for pipes	0	9
Letting in washers	1	0
1″ holes for ironwork	0	3
Coping cramps, let in with cement	0	6
„ run with lead	0	9
Plain ends to steps	1	2

PURBECK STONE.

	Per ft. sup. s.	d.
Paving, tooled, in random courses	1	2
„ „ in straight „	1	5
„ rubbed „ „	1	10
If set in cement .. add	0	2
Old paving taken up, squared, and relaid	0	4
	per ft. run.	
Steps, 10 × 6	3	0

CORNISH GRANITE.—QUARRY PRICES.

		s.	d.
Scappled granite, in random sizes, from 8 ft. to 40 ft. cube	per ft. cube	2	6
Ditto to fixed dimensions, 8 ft. to 40 ft. cube	„	3	0
Extra for each additional 10 ft. cube per block	„	0	2
On ship-board in London:			
Plain face, finely axed	per ft. super.	2	6
Ditto, once axed	„	2	0
Plain beds and joints	„	1	6
Sunk work, extra, from	„	1	0
Moulded work			

Granite.

	Aberdeen, per ft. cub.	Cornish, per ft. cub.
	s. d.	s. d.
In block, including hoisting and setting	6 6	5 9
	per ft. sup.	
Plain face, finely axed	3 0	2 6
" roughly "	2 6	2 0
" to beds and joints	2 0	1 6
Sunk work, rough	2 8	2 2
" faced	4 0	3 6
Moulded work..	4 6	4 0
" (circular)	5 3	4 6
Paving, 5 in. thick, laid straight ..	2 10	2 6

Moore Stone.

	per ft. sup.
	s. d.
Paving, 4 in. thick	2 0
" 6 "	2 6
	per ft. run.
Step	2 10
Curb	2 6
Cutting channel	1 9
Craigleith Stone.	per ft. cub.
In block, including hoisting and setting	6 0
	per ft. sup.
Plain work	1 6
Sunk "	2 6
Moulded "	3 0
" (circular)	4 0
Kentish Rag.	per yard cube.
Random walling	16 6
" coursed walling	19 6
Square " "	22 6
	per ft. sup.
Hammer-dressed face	0 4
	per ft. run
" " quoins	1 2
	per yard super.
Pointing with blue ash mortar	1 8

Prime Cost Prices of Stones in General Use.

		s.	d.
Abercarne Sandstone.			
Blocks, at quarry	per ton	11	0
Walling	per ft. cub.	2	3
Ditto, rough	,,	1	3
Paving	,,	1	9
Ayrshire Red Sandstone.			
Blocks, in London	,,	1	9
Ancaster Oolitic Stone.			
Random block, in trucks at Ancaster	,,	1	2
Ditto, at King's Cross, London	,,	1	9

Bath Stone.

In railway trucks, full loads, random block, per foot cube.

	Corsham Down and Ground Stone.	Farleigh Down.	Box and Combe Down.	Westwood Ground
	s. d.	s. d.	s. d.	s. d.
At Quarry Stations	0 10	0 10	0 10	0 10
At Paddington, G. W. R., Mileage Station ..	1 4½	1 4½	1 4½	1 4½
Ditto, High Level, waterside, including use of crane	..	..	..	..
At Nine Elms, S. W. R. ..	1 6¼	1 6¼	1 6½	1 6½
At Brentford Docks (in barge)	..	..	..	..

Selected Blocks 1*d*. per foot cube extra.

Paving.—3 in. Corn Grit or Corsham, at 3*d*. per foot super.

Ashlar.—Random Corsham Down Ashlar, from 4 to 8 inches thick, 1*d*. per foot cube less than block.

Range Stone.—Sawn Corsham Down Range Stone, same price per foot cube as Ashlar.

This stone is cut to range in courses, 4, 5, 6, 7, and 8 in. deep, and varies from 3 to 7 in. wide. Four yards make a ton.

PRICES OF STONES—*continued.*

BATH STONE—*continued.*

The following are the Prices of Bath Stone (Corsham Down and Box Ground Stone), delivered at the several places named, in random blocks per foot cube:—

	s.	d.		s.	d.
Barnstaple	1	7½	Hastings	1	9½
Basingstoke.. ..	1	5	Hereford	1	5
Battersea	1	9	Herne Bay	1	10½
Berkhampstead ..	1	6	Ipswich	1	10½
Birmingham ..	1	5	Leicester	1	7
Brentford Docks..	1	5¾	Lewisham	1	9
Bricklayers' Arms	1	7½	Maidstone	1	9
Brighton	1	8½	Nine Elms	1	7½
Bury St. Edmonds	1	10	Northampton ..	1	6
Cambridge	1	7¼	Norwich	1	11¾
Canterbury	1	9	Oxford	1	4
Cardiff	1	5¼	Paddington	1	5
Chatham	1	8¾	Penzance	2	2¾
Chelmsford	1	9¼	Peterborough ..	1	8¼
Cheltenham.. ..	1	2¾	Plymouth	1	9¾
Chertsey	1	6	Reading	1	4½
Croydon	1	8	Richmond	1	7
Epsom	1	7	Salisbury	1	2¾
Exeter	1	6	Southampton ..	1	5½
Forest Hill	1	7¾	Swansea	1	6½
Gloucester	1	2½	Weymouth	1	4½
Gravesend	1	9¼	Wolverhampton..	1	5¾
Guildford	1	6¼	Worcester	1	4½

BEER, DEVONSHIRE FREESTONE.

	s.	d.
Blocks at quarry .. .. per ft. cube	0	9
Ditto in London, delivered .. .. ,,	1	7
Ditto in truck at Seaton .. .. ,,	1	0

CHILMARK LIMESTONE.

Blocks on trucks at Dinton, hard ..per ft. cube } Ditto, soft .. .. ,, }	1/6 to 1/8
Ditto, at Nine Elms .. .. .. ,,	1/6 ,, 2/2

PRICES OF STONES—*continued.*

	s.	d.
DOULTING OOLITE.		
Labour about the same as Bath		
Blocks 35ft. cube, in trucks at Doulting per ft. cube	0	10
Ditto, at Paddington .. .. .. „	1	5½
Ditto, at Nine Elms .. .. .. „	1	7½
Selected blocks, extra .. .. .. „	0	1
Blocks sawn to dimensions, extra .. „	0	6
Rough walling stone, at quarry .. per ton	10	0
NOTE.—Ordinary work in Doulting Stone, in jambs, sills, heads, &c., has been supplied in London at about 4s. 9d. per foot cut.		
DUKES QUARRIES, DERBYSHIRE SANDSTONE.		
Blocks on trucks at Whatstandwell, per ft. cube	0	10
Ditto at St. Pancras .. .. .. „	1	7
DUMFRIES, RED SANDSTONE, LOCHARBRIGGS QUARRY.		
Blocks at quarry .. .. „	0	8
Ditto, London, not exceeding 10 ft. cube „	2	4
Ditto, „ „ 20 „ „	2	6
Ditto, „ „ 30 „ „	2	8
Ditto, „ „ 40 „ „	2	10
GATHERLEY MOOR SANDSTONE.		
Dimension Ashlar, at quarry .. .. „	1	3
Ditto, at London .. .. „	2	9
Ditto, extra large, at quarry .. „	1	6
Ditto, at London .. .. „	3	0
Random Ashlar, at quarry .. .. „	1	2
Ditto, at London .. .. „	2	8
HAM HILL STONE.		
Random blocks, 20 ft. cube, at Quarry „	1	0
At Paddington .. .. „	1	11
Selected blocks, extra .. .. .. „	0	1
Sawn to dimensions, extra .. .. „	0	6
HAYDOR STONE, OOLITE.		
Same price as Ancaster stone.		
HOLLINGTON SANDSTONE.		
In blocks, on trucks at quarry .. „	1	0
Selected .. .. „	1	6

Prices of Stones—*continued.*

	s.	d.
Hopton Wood, Derbyshire Limestone.		
Blocks at quarry.. .. .. per ft. cube	2	0
From the saw, on rail at the works.		
Sawn landings, up to 4 ft. square.		
5 in. thick .. .. per ft. sup.	2	6
6 in. ,, ... ,,	3	0
7 in. ,, ... ,,	3	6
6 ft. square.		
5 in. thick .. .. ,,	3	0
6 in. ,, ... ,,	3	6
7 in. ,, ... ,,	4	3
Square and bevel steps, up to 5 ft. long.		
5 in. thick .. .. ,,	2	3
6 in. ,, ... ,,	2	9
7 in. ,, ... ,,	3	3
7 ft. long.		
5 in. ,, ... ,,	2	9
6 in. ,, ... ,,	3	3
7 in. ,, ... ,,	4	0
Sawn pavings, in random or irregular courses, cleansed on face.		
Slabs under 4 ft. long, 1½ in. thick per ft. sup.	0	8
Ditto, 2 in. thick .. .. .. ,,	0	10
Ditto, 3 in. ,, ... ,,	1	2
Slabs 4 to 6 ft. long, 1½ in. thick.. ,,	0	9
Ditto, 2 in. thick .. .. .. ,,	0	11
Ditto, 3 in. ,, ... ,,	1	4
Diamond paving.		
1½ in. thick, coped to size, from 1 ft. to 2 ft. square.. .. .. ,,	0	9
2 in. ditto.. .. .. ,,	0	11
2½ in. ditto .. .. ,,	1	1
If squared and jointed ready for laying, 2*d.* per foot extra.		
Head and flat stones.		
Up to 6 ft. long, 3 in. thick .. .. per ft. sup.	1	6
Ditto 3½ ,, ... ,,	1	8
Ditto 4 ,, ... ,,	1	10

PRICES OF STONES—*continued.*

	s.	d.
JACKDAW CRAG, MAGNESIAN LIMESTONE.		
In blocks on trucks at Tadcaster .. per ft. cube	0	10
Walling stones .. .. per yd.cube	2	6
KETTON STONE, OOLITE.		
No. 1 coarse stone blocks, 2 ft. cube to 5 ft. long, at quarry .. .. per ft. cube	2	0
Ditto, 2 ft. cube to 8 ft. long.. .. „	3	0
No. 2, best ditto, 2 ft. cube to 4 ft. long „	2	3
Ditto 2 ft. „ 7 ft. „ „	3	6
Ditto 2 ft. „ 8 ft. „ „	4	0
KENTISH RAGSTONE, Delivered alongside Thames at London.		
Hammer-dressed, squared facings, in courses from 4 in. to 10 in. high, as X or Y .. .. per ton	12	0

X

Y

PRICES OF STONES—*continued.*

KENTISH RAGSTONE—*continued.*

		s.	d.
Hammer-dressed random facing as Z	per ton	8	0

Z

		s.	d.
Hammer-dressed angle quoins, with drafted angle	per ft. rise	1	6
Rubble	per ton	4	6
Hassock	per yd. cube	4	0

MANSFIELD STONE,

Delivered in full truck loads at St. Pancras Station, London.

(At Quarry, 1*s.* 9*d.* to 2*s.* 6*d.*)

		s.	d.
Blocks, red or white, from the Mansfield quarries, best quality, random sizes, none of which will exceed 4 ft. in length or 2 ft. in thickness	per ft. cube	3	0
Blocks, selected, large enough to make given sizes, none being more than 7 ft. long, 3 ft. wide, or 2 ft. thick	"	3	6
Blocks, ditto, and up to 3 ft. thick ..	"	3	9
Ditto 3½ ft. " ..	"	4	0
Ditto 4 ft. " ..	"	4	6
Step or landing blocks of white stone, from the lower beds, random sizes, none being over 7 ft. long or 3 ft. wide	"	2	6

Prices of Stones—*continued.*

Mansfield Stone—*continued.*		s.	d.
Step or landing blocks, selected, large enough to make given sizes, none being over 8 ft. long or 4 ft. wide	per ft. cube.	3	0
Ditto, not over 6 ft. long or 6 ft. wide	„	3	6
Ditto, not over 8 ft. long or 8 ft. wide	„	4	0
Yellow magnesian limestone, from the Mansfield Woodhouse quarries. (At Quarry, 2*s.* to 4*s.*)			
Blocks of selected quality, none over 4 ft. long or 1 ft. thick ..	per ft. cube	3	6
Blocks not over 5 ft. long	„	4	0
Tomb or gravestone blocks, not over 6 ft. long	„	5	0
Blocks, not over 7 ft. long	„	6	0
Red or white landings, ledgers, and gravestones, sawn both sides, not less than 4 in. thick, and not exceeding 20 ft. super..	„	6	6
Not exceeding 40 ft. super. ..	„	8	0
„ 60 ft. „ ..	„	9	6
„ 80 ft. „ ..	„	11	0
Red or white stone, sawn to nett dimensions for masons' work, of not less scantling than 12 × 6, or more than 7 ft. long..	„	6	6
Yellow magnesian limestone, sawn in like manner	„	9	9
Circular red shafts or columns ..	per lineal ft.		
Dia. 4 in., 6 in., 8 in., 10 in., 12 in., 15 in., 18 in., 24 in.			

Note.—White blocks from the lower beds are thinner and much harder than the best stone, and are chiefly used for sawing into landings and steps, and for heavy foundations where blocks of large surface are required.

PRICES OF STONES—*continued.*

	s.	d.
PAINSWICK AND PORTLAND STONE. Random blocks, in railway trucks, full loads.		
Painswick.		
At quarry stations .. .. .. per ft. cube	1	2
At Paddington, G.W.R., mileage station .. .. ,,	1	8
At Paddington, G.W.R., high level, water-side, including use of crane .. .. ,,	1	8
At Nine Elms, S.W.R. .. .. .. ,,	1	10
At Bricklayers' Arms, S.E.R. .. ,,	1	10½
In barge at Brentford Docks .. ,,	1	8
Portland, 20 ft. per block average.		
At quarry stations.. .. .. .. ,,	1	3
At Paddington, G.W.R., mileage station .. .. ,,	1	7
At Paddington, G.W.R., high level, water-side, including use of crane .. .. ,,	1	7
At Nine Elms, S.W.R. .. .. .. ,,	1	7
At Bricklayers' Arms, S.E.R. .. ,,	..	
In barge at Brentford Docks .. ,,	..	
PORTLAND STONE. Quarry prices. Including delivery to ship or rail at Portland.		
Block stone, brown, random sizes.		
Averaging* 20 cubic ft. per block per ft. cube	1	3†
,, 24 ,, ,, ,,	1	4
,, 28 ,, ,, ,,	1	5
,, 32 ,, ,, ,,	1	6
,, 36 ,, ,, ,,	1	7

* This is the usual average for cargoes and truck loads. Large special blocks may be reduced to this average and price by taking with them same weight in smaller blocks.

† At Nine Elms London Wharf, 1*s*. 9*d*.

PRICES OF STONES—*continued.*

PORTLAND STONE—*continued.*		s.	d.
Block stone, brown, random sizes.			
Averaging 40 cubic ft. per block	per ft. cube	1	8
" 48 " "	"	1	9
" 56 " "	"	1	10
" 64 " "	"	1	11
" 72 " "	"	2	0
" 80 " "	"	2	1
Larger averages (up to the greatest obtainable sizes) at proportionate prices.			
White Portland, for monumental purposes, &c., and blocks of selected quality, more	per ft. cube	0	1
Blocks selected to hold not less than given dimensions, extra	"	0	1
Sawn slabs, random sizes, edges rough.			
1 in.	per ft. super.	0	5½
1½ in...	"	0	6½
2 in.	"	0	7
2½ in...	"	0	8½
3 in.	"	0	10
3½ in...	"	1	0
4 in.	"	1	1
5 in.	"	1	3
6 in.	"	1	5
7 in.	"	1	7
8 in.	"	1	9
9 in.	"	1	11
If exceeding 12 ft. sup., extra ..	"	0	0¼
" 18 " ..	"	0	1
" 24 " ..	"	0	2
" 30 " ..	"	0	3
" 36 " ..	"	0	4
" 42 " ..	"	0	5
" 48 " ..	"	0	6
Outside slabs (if in stock), less than above prices	"	0	2
Headstones, with sawn edges, 2ft. 6 in. wide, 3 in. thick	"	1	0

PRICES OF STONES—*continued.*

PORTLAND STONE—*continued.*

Sawn scantlings, random lengths, ends rough.

Thickness.	Width.					
	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
Inches.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
3	0 7	0 8	0 9	0 10	0 11	1 0
4	0 8	0 9	0 11	1 0	1 1	1 3
5	0 10	0 11	1 1	1 2	1 4	1 5
6	0 11	1 1	1 3	1 4	1 6	1 8
7	..	1 3	1 5	1 7	1 9	1 10
8	..	..	1 7	1 9	1 11	2 0
9	..	..	..	1 11	2 1	2 3
10	..	..	..	..	2 3	2 5
11	..	..	..	..	..	2 8
12	..	..	..	..	..	..
	12 in.	13 in.	14 in.	15 in.	18 in.	21 in.
Inches.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
3	1 1	1 3	1 4	1 5	1 8	1 11
4	1 4	1 6	1 7	1 8	1 11	2 3
5	1 6	1 8	1 10	1 11	2 3	2 7
6	1 9	1 11	2 0	2 2	2 7	2 11
7	1 11	2 1	2 3	2 5	2 10	3 4
8	2 2	2 4	2 6	2 8	3 2	3 8
9	2 5	2 7	2 9	2 11	3 6	4 0
10	2 7	2 9	2 11	3 2	..	..
11	2 10	3 0	3 2	3 4	..	..
12	3 0	3 3	3 5	3 7	..	..

	s.	*d.*
Up to 12 in. wide.		
If over 4 feet long, add .. .. .. per foot run	0	$0\frac{1}{2}$
„ 5 „ .. .. .. „	0	1
„ 6 „ .. .. .. „	0	$1\frac{1}{2}$
„ 7 „ .. .. .. „	0	2
„ 8 „ .. .. .. „	0	$2\frac{1}{2}$
Spandrel steps, same price as above, measuring rise and tread of mould.		

PRICES OF STONES—*continued.*

	s. d.
ROCHE ABBEY, MAGNESIAN LIMESTONE.	
Blocks to dimensions, 7 in. to 16 in. thick, on trucks at Doncaster .. per ft. cube	2 0
Random blocks .. .. ,,	1 9
SEACOMBE, DORSETSHIRE LIMESTONE.	
Blocks at quarry .. .. per ft. cube	1 4
Blocks at London .. .. ,,	2 0
STAINTON SANDSTONE.	
Blocks on trucks at quarry .. .. ,,	1 8
Ditto in London .. .. ,,	2 6
Blue Whinstone paving sets.	
In trucks at quarry .. .. .. per ton	14 0
Ditto in London .. .. ,,	24 0
STANCLIFFE, DERBYSHIRE SANDSTONE.	
Blocks at quarry .. .. per ft. cube	1 6
Ditto, extra large, up to 16 ft. long ,,	2 6
TISBURY STONE.	
Random blocks on rail at Tisbury .. ,,	1 1
Ditto at Nine Elms, London .. ,,	1 5½
Labour same as Portland for hard bed.	
Ditto on scolt bed, about 10 per cent. more than Bath stone.	

SCOTGATE ASH STONE.

Prices on truck at quarries, Pateley Bridge, Leeds.

PAVING, OR FLAGS.

	Per Yard Superficial.					
	1½ in.	1½ in. to 2 in.	2 in.	2½ in.	3 in.	4 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Self-faced	1 10	2 1	2 4	2 10	3 1	3 7
Rough Boasted	..	..	2 10	3 4	3 7	4 1
Tooled	2 3	..	3 6	4 1	4 3	4 9
Rubbed	..	4 2	4 5	4 10	5 1	5 8

PRICES OF STONE—*continued.*

SCOTGATE STONE—*continued.*

Tooled Landings.

	$2\frac{1}{2}$ in.	3 in.	4 in.	5 in.	6 in.	7 in.
	d.	*d.*	*d.*	*s. d.*	*s. d.*	*s. d.*
Per ft. Superficial	7	8	10	1 1	1 3	1 5

Self-faced Landings, 2*d.* per foot superficial less. Dimension Landings, under 30 feet, 1*d.* per foot extra; and 1*d.* per foot extra for every additional 10 feet above 30. For Rubbed Landings add 3*d.* per superficial foot to Tooled price. For Landings, Tooled two sides, add 5*d.* per superficial foot. Cemetery Headstones or Landings 2*s.* 6*d.* per foot cube. For Superficial Tooling, 2*d.* per foot extra.

		s.	*d.*
Steps and Hewing Work in the Rough	per ft. cube	1	4
Tooled Random Steps, 12 × 6 to 8 at	per ft. lin.	1	1
" " 12 × 4 at ..	"	0	9
" " 12 × 3 at ..	"	0	8
Random Green Craig Blocks	per ft. cube	1	4
" White "	"	1	6
" Scotgate " (for Cemetery purposes)	"	2	0
Tooled Edging, 3 in.	per yd. lin.	1	2
" 4 in.	"	1	5
" 5 in.	"	1	8
" 6 in.	"	1	11
Boasted Curbs, 10 × 6	"	1	9
" 10 × 7	"	2	0
" 10 × 8	"	2	3
" 12 × 6	"	2	2
" 12 × 8	"	2	9
Wallstones.			
Hammer dressed..	per rood of 14 yds.	38	0
Pitch-faced	"	42	0
Insides	"	21	0
" 5 in. Parpoints ..	"	22	0
Setts.			
6 in. at	"	42	0
8 in. at	"	40	0
8 in. Best at	"	46	0
9 in. at	"	48	0
Paviors	per ton	6	6
Tooled 6 in. Sinks	per ft. super.	1	3
Lamb Self Flags	per yd. super.	1	4

PRICES OF STONE—*continued.*

CLIPSHAM QUARRIES, OAKHAM, RUTLAND.

This stone may be had in blocks of any portable size, from 1 to 3 feet on bed.

Prices of delivery for random blocks, per 1000 feet:—

	s.	d.		s.	d.
Arsley	1	9	Lincoln	1	8
Barnet	1	10	Lynn	1	9½
Bawtry	1	9	Manchester	2	0
Biggleswade	1	9	March	1	8
Boston	1	8½	Newark	1	7½
Bishop Stortford	2	0	Northampton	1	7
Cambridge	1	7	Nottingham	1	8
Claypole	1	7	Potter's Bar	1	10
Doncaster	1	10	Peterborough	1	6½
Grantham	1	6	Retford	1	9
Finsbury Park	1	10½	Rugby	1	9½
Hatfield	1	9	Southgate	1	10
Hornsey	1	10	Stevenage	1	9
Hitchin	1	9	Sandy	1	9
Huntingdon	1	8	St. Neots	1	8½
Holme	1	7	St. Albans	1	9½
Hertford	1	9½	Spalding	1	7
Holbeach	1	7½	Stamford	1	6
Leicester	1	10	St. James Deeping	1	7

Dressed rubble wall stones, per yard super. 3*s.* in trucks.

London Stations.

	s.	d.		s.	d.
King's Cross	1	10½	Blackfriars	2	0½
Poplar Docks	1	11½			

4½ Ashlar, per yard super. at 6*s.* 6½*d.* in trucks at Little Bytham Station, G.N.R.

PRICES OF STONE—*continued.*

BLAIR QUARRY, CULROSS, N.B.	At the Quarry.		Shipped Free on Board at Quarry Pier.	
	s.	d.	s.	d.
Ashlar:—				
Common 12 broad, by 5 to 7 thick.	0	7½	0	8
„ 12 „ by 8 to 9 „	0	8	0	8½
„ 12 „ by 9 to 10 „	0	10½	0	11
Rybats, or Corners:—				
Common 12 broad, 6 to 8 hds. 2 ft. lg.	1	3	1	4
Ashlar do. 12 „ 10 to 12 „	1	6	1	7
„ do. 12 „ 12 to 14 „	1	7	1	9
Courses:—				
5 to 7 by 6 to 8 per lineal foot ..	0	4½	0	5
Jambs:—				
5 inch thick.. .. .. per rising ft.	0	9½	0	10
Jamb Lintels .. .. per lineal ft.	0	8	0	8½
Skews:—				
5 inch thick.. .. .. „	0	8	0	8½
Long Stones, or Sills and Lintels:—				
In length 4 ft. 6 × 12 × 6 to 7 ..	0	8	0	9
„ 6 „ × 12 × 7 to 8 ..	0	10	0	10½
„ 8 „ × 12 × 7 to 8 ..	1	0½	1	1
„ 10 „ × 12 × 7 to 8 ..	1	8	1	9
Cornice Copes or Dado, not confined to certain Lengths:—				
Containing 6 sup. at 6 thick sup. ft.	0	8	0	9
„ 8 „ 8 „	0	9	0	10½
„ 10 „ 9 to 10 „	0	11	1	0
„ 12 „ 10 to 12 „	1	2	1	5
Square Stones, or Columns:—				
Stones 6 ft. long by 12 × 12 per lin. ft.	1	4	1	5
„ 8 „ by 12 × 12 „	1	8	1	9
„ 10 „ by 12 × 12 „	2	0	2	1
„ 14 „ by 16 × 16 „	2	9	3	10
Cube Stones:—				
Stones at and under 5 cubic feet ..	1	2	1	3
„ „ 20 „ ..	2	0	2	1
Ruble Stones:—				
Rubble Stones .. .. .. per ton	1	1	1	7
Foundation Stones, random size, per ton	3	1	3	7

PRICES OF STONE—*continued.*

YORKSHIRE STONE.

P. C. in trucks at quarries.

	1½ in. thick.	2½ in. thick.	3 in. thick.
	s. d.	s. d.	s. d.
Self-faced Flags, per yd.	1 11	3 4	3 9
Tooled Flags „	2 5	4 5	4 8
	2 in.		
Polished .. „	4 11	5 3	5 6

Landings, per foot. superficial.

	Average thickness.						
	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Self-faced	0 8	0 9	1 0	1 2	1 4	1 6	1 8
Tooled	0 10	0 11	1 2	1 4	1 7	1 8	1 11
Polished	..	1 1½	1 3½	1 6	1 8½	1 11	2 1

Tooled Coping, per lineal yard.

in. 12×2	in. 13×2	in. 13×2½	in. 12×2½	in. 12×3	in. 13×3	in. 18×3
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2 0 ..	2 2 ..	2 5 ..	2 3 ..	2 6 ..	2 8 ..	3 9

Note.—The above prices for lots of not less than 4 tons.

TOTTERNHOE STONE.

Limestone, argillaceous, colour, greenish white; weight, 116 lbs. per foot cube; used at restoration of St. Albans Abbey, &c. Price on trucks at Stanbridge, 1*s.* per foot cube, at L. and N.-W. Railway, London, 1*s.* 3*d.* per foot cube.

PRICES OF STONE—*continued*.

PARK SPRING STONE.
P. C. in trucks at quarry.

	Thickness, per foot super.											
	2 in.		2½ in.		3 in.		4 in.		5 in.		6 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Slabs same both sides	0	8½	0	10	0	11¾	1	5	1	8	1	11
Headstones ..	..		..		1	1	1	6	1	10	2	1

2 in. to 2½ in. outside slabs	per yd. super.	5	0
2 in. sawn flags	„	4	9
Blocks for monuments	per ft. cube	2	0
„ random	„	1	10
Steps, 12 in. × 6 in., sawn bed and edge	per ft. run.	1	7
Sinks, 6 in. thick, tooled random sizes	per ft. super.	1	8

MARBLE, IN BLOCK.

	Per Foot Cube.							
	£	s.	d.		£	s.	d.
Amber	1	3	0	to	1	15	0
Bardilla	1	0	0	„	1	10	0
Black spotless	1	10	0	„	2	10	0
„ and gold	2	15	0	„	3	15	0
Brocatella	1	1	0	„	1	7	0
Dove	1	0	0	„	1	6	0
Emperor's red and San Juan ..	1	2	0	„	1	9	0
Kilkenny	0	18	0	„	1	6	0
Rouge Royal	1	5	0	„	1	15	0
Serpentine	1	4	0	„	1	14	0
Sicilian	0	9	0	„	0	16	0
Sienna	3	0	0	„	4	0	0
Statuary	2	12	0	„	4	10	0
Veined	0	15	0	„	1	10	0
Verd antique	2	15	0	„	4	5	0

Irish Marbles in Block.

	Per Foot Cube.			
	s.	d.	s.	d.
Cork Red	15	0	to 25	0
Midleton	15	0	,, 35	0
Moneen	15	0	,, 25	0
Fossil	10	0	,, 12	0
Dove	15	0	,, 20	0
Black	17	0	,, 30	0
Green (Galway)	25	0	,, 60	0

Devonshire Marble.

In railway trucks at Plymouth.

	s.	d.
Blocks under 3 feet long .. .. .. per foot cube	4	8
,, 4 ,, ... ,,	5	10
,, 6 ,, ... ,,	7	0
Over 6 feet, special prices.		
Columns.		
2 in. diameter up to 2 ft. long .. per foot run	7	0
3 ,, ,, 3 ,, .. ,,	7	7
4 ,, ,, 4 ,, .. ,,	8	9
5 ,, ,, 5 ,, .. ,,	9	11
6 ,, ,, 6 ,, .. ,,	11	8
8 ,, ,, 6 ,, .. ,,	15	2
10 ,, ,, 6 ,, .. ,,	17	6
12 ,, ,, 6 ,, .. ,,	24	6
Over 6 ft. long and 12 in. diam., special prices.		
Steps.		
4 in. wide × 6 in. thick .. .. .. per foot run	4	8
6 ,, × 6 ,, ... ,,	7	0
8 ,, × 6 ,, ... ,,	8	2
10 ,, × 6 ,, ... ,,	10	6
12 ,, × 6 ,, ... ,,	11	1
14 ,, × 6 ,, ... ,,	12	3
16 ,, × 6 ,, ... ,,	13	5
18 ,, × 6 ,, ... ,,	16	4
20 ,, × 6 ,, ... ,,	18	8

Marble Slabs, Polished and Set.

	Per Foot Superficial.							
	¾-inch.		1-inch.		1¼-inch.		1½-inch.	
	s.	d.	s.	d.	s.	d.	s.	d.
Veined	5	6	6	0	6	6	7	0
St. Ann's or Dove ..	6	0	6	6	7	0	7	6
Bardilla	6	3	6	9	7	3	7	9
Kilkenny	7	0	7	6	8	0	9	0
Black	7	6	8	3	8	9	9	3
Black and gold	10	6	12	6	14	0	15	6
Sienna or statuary ..	14	0	16	0	18	0	20	0

Labour on Marble.

	Per Foot Superficial.									
	Vein or Statuary.		Dove.		Bardilla.		Black or Kilkenny.		Black and Gold.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawing plain work, polished and set	3	6	4	0	4	6	4	9	5	3
Ditto sunk ditto, ditto ..	7	6	8	6	10	0	10	9	11	3
Ditto moulded ditto, ditto..	10	0	11	0	12	6	13	0	14	0
Ditto circular plain work ..	6	0	7	0	8	6	9	0	10	0
Ditto ditto sunk ditto ..	12	9	14	0	16	0	18	0	19	6
Ditto ditto moulded ditto ..	15	0	17	9	19	0	20	0	22	0

Plain work, only not polished, one-third less.

Marble. Labour, &c.

	Per Foot Run.	
	Vein or Statuary.	Dove and other marbles.
	s. *d.*	*s.* *d.*
Single beads or hollows	1 1	1 3
Double reeded edges	1 9	2 0
Treble "	2 3	2 6
Half-inch flutes	1 1	1 4
Three-quarter inch flutes	1 5	1 8
Inch flutes	1 7	1 11
Ovolo to edge of shelf	1 6	1 9
Back joint	0 4	0 5
Rebated joint	0 5	0 6
Sunk rebate	0 10	1 0
Plain work and polishing to edges	0 5½	0 7
1 in. polished edge	0 7	0 9
1½ "	0 8½	0 10½
2 "	0 11	1 1
	each.	
Plain rounded corners	1 1	1 3
Reeded "	1 6	1 9
Moulded "	2 0	2 6
Notches	0 10	1 0
Copper cramps and fixing ..	0 9	0 9
Sunk letters per inch in height ..	0 1½	0 2

Szerelmey Stone Liquid

For Waterproofing and Case-hardening Stone.

Transparent, per gallon, 5*s.* 0*d.* Will cover about 80 yards.
Opaque, " 8*s.* 6*d.* " 100 "

Galvanized Iron Cramps.

	Cramps.	Set in with Cement.	Set in with Lead.
	s. d.	s. d.	s. d.
Coping cramps .. .. each	0 $2\frac{1}{2}$	0 7	0 9
6-in. ,, ... ,,	0 3	0 8	0 10
8 ,, ,, ... ,,	0 $4\frac{1}{2}$	0 10	1 1
10 ,, ,, ... ,,	0 $6\frac{1}{2}$	1 1	1 4
12 ,, ,, ... ,,	0 9	1 4	1 9
Copper ,, .. per lb.	1 6	2 4	2 10

Patent Victoria Stone (Company's prices).

Exclusive of Fixing.

Crushing weight per square inch, 4675 lbs.

	Per Foot Super. At Works.
	s. d.
1 in. thick, in tiles, 12 in. × 12 in.	0 $4\frac{1}{2}$
,, ,, superior for corridors, &c.	0 7
2 in. thick, for street pavement, as laid for London Vestries	0 $7\frac{1}{2}$
,, laid in London	..
Hearths 2 in. thick	0 $8\frac{1}{2}$
	per ft. run.
Steps 12 in. × 3 in., with nosing	1 3
,, ,, triangular and with groove for flying stair, and nosing on front and side	2 8
Coping 12 in. × $2\frac{1}{2}$ in.	1 3
,, 17 in. × $2\frac{3}{4}$ in.	1 6
	each.
Caps for pillars, 1 ft. 9 in. square .. about	11 3
,, ,, 2 ft. 3 in. ,, .. ,,	14 8
	per ft. super.
Sinks, all sizes	1 9
Landings, 3 inches thick	1 1
,, 4 ,, ,, ...	1 5
Sills, 8 in. × 3 in.	1 0

Time and Materials.

		s.	d.
Mason	.. per hour	0	10½
Carver	„	1	1
Polisher	„	0	8½
Labourer	„	0	6½
Mortar	.. per hod	0	7
Plaster	.. per bag	1	0
„ fine	„	1	2
Roman cement	per bushel	2	0
Portland „	„	2	6
Sand	„	0	6

Terra-cotta.

The price of terra-cotta varies according to the quantity that can be cast from one mould. The greater the quantity of one article, the cheaper the work. The following prices may be taken as a guide:—

Red Terra-cotta.

(Exclusive of Fixing and Filling in.)

	Each.		Per Foot Run.	
	s.	d.	s.	d.
Coping, saddle-back, 10 in. × 10 in. ..	—		3	0
Mitres to ditto, extra	2	0	—	
Moulded string, 12 in. × 6 in.	—		2	6
Cornice moulded, 24 in. × 12 in... ..	—		7	0
Mitres to ditto, extra	3	6	—	
Open ornamental parapet, 22 in. × 22 in. and 4½ in. thick	—		5	0
Gurgoyles, 3 ft. × 1 ft. × 1 ft.	50	0	—	
Balls for finials, 2 ft. 9 in. × 1 ft. 6 in.	26	0	—	

40 per cent. should be added to the above prices for fixing and builder's profits.

BUFF TERRA-COTTA.

	Each.		Per Foot Run.	
	s.	d.	s.	d.
Keys, ornamented, 7½ in. × 22 in. ..	3	6	—	
Springers „ 9 in. × 21 in. ..	3	6	—	
Window arch, 5 parts, 3 ft. 6 in. opening	12	6	—	
Medallion, 13 in. disc.	5	0	—	
Open parapet, block and Coping, 26 in. high	—		7	6
Open parapet, block and coping, 18 in. high	—		4	3
Spandril window head, semi, 3 ft. × 1 ft. 6 in.	35	0	—	
Trusses, 18 in. deep, 5 face	8	6	—	
„ 30 in. × 12 in.	25	0	—	
Circular ballusters, 20 in. × 5 in. ..	3	4	—	
„ „ 15 in. × 6 in. ..	3	0	—	
Ball terminals, 39 in. high	21	0	—	
„ „ 21 in. „	10	0	—	
9 in. ornamental string course	—		2	6
Chimney partitions	3s. to 4s.		—	
Wall coping, 12 in. × 4 in...	—		1	0
„ „ 18 in. × 4	—		1	10

PAVIOR.

	Thickness.							
	5 in.		7 in.		8 in.		9 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
			per yd. super.					
Aberdeen granite paving in parallel courses, 5 in. wide	10	0	12	6	14	6	15	6
Ditto, in 3-in. courses	15	6	18	6	21	0	23	0
Taking up old paving and relaying, including gravel and making ground	1	2	1	3	1	5	1	7

	per yd. sup. s. d.
Grouting granite paving	0 7
Concrete foundation, 6 in. thick	1 4
	per ft. run.
12 × 6 granite curb	2 0
12 × 8 „ „	2 4
7 × 5 „ channel	1 3
	per ton.
Broken granite to pass through 1½-in. sieve ..	20 0

Time and Material.

		s.	d.
Pavior	per hour	0	9½
Labourer	„	0	6½
Navigator	„	0	7
„ working in water	„	0	8
Pebbles	per ton	15	6
Aberdeen granite	„	30	0
Purbeck squares	„	30	0
Clay	per yd. cube	6	6
Red pit gravel	„	9	6
Gravel, unscreened	„	6	0
„ coarse screened ballast ..	„	7	0
„ fine	„	7	6
Carting rubbish	per load	3	6
One horse, cart, and man	per day	12	6

Holman's Tar Paving.

	per yard sup. s. d.
For schools, railway platforms, and pathways	2 6
For roadways, 4 inches thick	3/0 to 4/6

Tar Pavement.

Thickness	3 in.	4 in.	6 in.	9 in.
	s. d.	s. d.	s. d.	s. d.
Price.. .. .. per yd. super.	2 3	3 3	4 3	5 3

Seyssel Asphalte (*Claridge's Patent*).

For pavement and flooring on the level of ground.

Quantity.	Thickness. $\frac{5}{8}$ in.	$\frac{3}{4}$ in.	1 in.
	s. d.	s. d. per super. ft.	s. d.
Horizontal Work.			
5000 ft. and upwards	0 $7\frac{3}{4}$	0 $8\frac{1}{2}$	0 $10\frac{1}{2}$
3000 „ „ under 5000 ft.	0 8	0 $8\frac{3}{4}$	0 $10\frac{3}{4}$
1000 „ „ „ 3000 „	0 $8\frac{1}{2}$	0 $9\frac{1}{4}$	0 $11\frac{1}{2}$
300 „ „ „ 1000 „	0 $8\frac{3}{4}$	0 $9\frac{1}{2}$	1 0
For Roofing, &c.			
5000 ft. and upwards	0 $9\frac{1}{4}$	0 $10\frac{1}{4}$	1 1
3000 „ „ under 5000 ft.	0 $9\frac{1}{2}$	0 $10\frac{3}{4}$	1 2
1000 „ „ „ 3000 „	0 $9\frac{3}{4}$	0 11	1 3
300 „ „ „ 1000 „	0 $10\frac{1}{4}$	0 $11\frac{1}{2}$	1 4

Hoisting.

If above 30 and not exceeding 50 ft., add for each super. ft. $\frac{1}{4}d.$
„ 50 „ 70 „ „ $\frac{1}{2}d.$

		per ft. sup. s. d.
Damp course, 5000 ft. and upwards	$\frac{1}{2}$ in. thick	0 $6\frac{1}{2}$
„ 1000 „ to 5000 ft...	„	0 $7\frac{1}{2}$
„ 250 „ „ 1000 „	„	0 $7\frac{3}{4}$
Channels, 6 in. to 9 in. wide, extra	per ft. run	0 4
„ 9 „ „ 12 „ „ „	„	0 6
Shallow channels	„	0 2
Skirting, $\frac{1}{2}$ in. thick, 4 in. high	„	0 5
„ „ 6 „	„	0 7
„ „ 9 „	„	0 10
„ „ 12 „	„	1 0
Fillets, $1\frac{1}{2}$ in.	„	0 2
„ 3 „	„	0 $3\frac{1}{2}$
Concrete, $1\frac{1}{2}$ in. thick	per ft. sup.	0 1
Labour—Spreader	per day	6 6
Caldron man	„	5 0

Felt.

		s. d.
Asphalte roofing felt, in rolls, 32 in. wide ..	per ft. sup.	0 1
Sheathing felt, 1 ft. 8 in. × 2 ft. 8 in.	per sht.	0 6

CARPENTER.

Prime Cost Price of Materials.

Wholesale Prices of Timber, Deals, &c.

Deals, &c., per Petersburg Standard.	£	s.	d.		£	s.	d.
Archangel, 1st	19	0	0	to	20	0	0
Ditto 2nd	13	10	0	„	16	0	0
Petersburg	15	0	0	„	18	10	0
Wyburg	13	0	0	„	15	0	0
Petersburg and Riga white ..	9	10	0	„	10	10	0
Christiana deals, best sorts, yellow and white	13	0	0	„	14	10	0
Norway deals, other sorts	8	0	0	„	11	10	0
Ditto battens, all sorts	6	0	0	„	9	10	0
Swedish deals, mixed..	15	0	0	„	17	0	0
Ditto 3rd	13	0	0	„	15	10	0
Ditto inferior and 4th	10	10	0	„	12	10	0
Geffle yellow	9	15	0	„	15	0	0
Soderhamn	8	10	0	„	16	10	0
Battens 60s. less than deals.							
Finland deals, 1st	11	10	0	„	15	0	0
Ditto battens	9	10	0	„	11	15	0
Ditto handsawn deals	8	0	0	„	8	10	0
Ditto ditto battens	7	10	0	„	8	0	0
United States pitch pine	11	15	0	„	12	10	0
Quebec yellow pine, 1st floated	14	0	0	„	22	0	0
Ditto 2nd „	9	10	0	„	13	10	0
Ditto 3rd „	6	10	0	„	8	10	0
Ditto 1st bright	16	0	0	„	24	0	0
Ditto 2nd „	10	10	0	„	14	10	0
Ditto 3rd „	7	0	0	„	9	0	0
Canadian spruce, 1st	10	0	0	„	11	10	0
Ditto 2nd..	8	0	0	„	9	0	0
Ditto 3rd..	7	0	0	„	8	0	0
New Brunswick spruce	8	0	0	„	8	10	0
Ditto spruce battens	7	10	0	„	8	0	0
Nova Scotia and Prince Edward's Isle	8	0	0	„	8	10	0

PRIME COST PRICE OF MATERIALS—*continued.*

	£	s.	d.		£	s.	d.
Timber, per load.							
Riga fir..	3	10	0	to	4	5	0
Dantzig and Memel crown ..	4	0	0	„	5	10	0
Ditto best middling	3	5	0	„	4	10	0
Ditto good ditto, and 2nd ..	3	0	0	„	3	15	0
Ditto undersized	2	10	0	„	3	0	0
Ditto small, short, and irregular	2	6	0	„	2	10	0
Stettin	2	15	0	„	3	10	0
Swedish	2	10	0	„	2	15	0
Ditto small	2	5	0	„	2	15	0
Swedish and Norway balks ..	1	16	0	„	2	5	0
Memel crown oak	5	10	0	„	8	0	0
Ditto brack „	5	5	0	„			
Dantzig and Stettin crown oak..	5	10	0	„	8	0	0
Ditto brack and unsquared ..	5	0	0	„	6	0	0
American large yellow pine ..	5	0	0	„	5	10	0
Ditto waney board	4	0	0	„	5	0	0
Ditto small	3	15	0	„	4	0	0
Ditto oak	6	10	0	„	7	0	0
Pitch pine	3	5	0	„	3	10	0
Rock elm	4	5	0	„	5	0	0
Ash	4	5	0	„	5	0	0
Quebec large birch	4	0	0	„	4	10	0
New Brunswick and Prince Edward's Isle birch	3	0	0	„	3	10	0
Ditto small averages	2	10	0	„	2	15	0
Indian teak	11	0	0	„	13	0	0
Mahogany, per foot super.							
Honduras, cargo average	0	0	4¾	„	0	0	6½
Mexican „	0	0	4¾	„	0	0	5½
Tobasco „	0	0	5	„	0	0	6
Cuba „	0	0	6	„	0	0	9
St. Domingo „	0	0	6	„	0	0	9
Ditto curls	0	0	10	„	0	1	6
Cedar, per foot super.							
Cuba	0	0	5½	„	0	0	6
Honduras and Mexican	0	0	5½	„	0	0	6

PRIME COST PRICE OF MATERIALS—*continued.*

	£	s.	d.		£	s.	d.
Cedar—*contd.*, per foot super.							
Australian	0	0	3¼	to	0	0	4
Pencil	0	0	2	„	0	0	4½
Walnut, per foot super.							
Italian	0	0	4¾	„	0	0	5½
Black Sea	0	0	5	„	0	0	7
Canadian	0	0	3	„	0	0	4
Maple, per foot super.							
Bird's eye	0	0	4	„	0	0	7
Satinwood, per foot super.							
Bahama	0	0	7	„	0	1	0
Rosewood, per ton.							
Bahia	12	0	0	„	20	0	0
Rio	14	0	0	„	25	0	0
Flooring boards, per square of 1 in.							
First yellow	0	14	6	„	0	15	9
Ditto white	0	12	0	„	0	13	3
Second qualities	0	10	0	„	0	12	0
Matched boards (per square ⅝ in. and ¾ in.)	0	7	0	„	0	11	0
Wainscot, per 18 ft. cube.							
Riga crown, English and Dutch	5	15	0	„	6	10	0
Ditto brack	4	15	0	„	5	0	0
Memel crown	4	15	0	„	5	10	0
Ditto brack	3	15	0	„	4	5	0
Oak staves, per mille of pipe.							
Memel crown	182	10	0	„	190	0	0
Ditto brack	150	0	0	„	160	0	0
Canadian standard pipe	85	0	0	„			
Ditto puncheon, per 1200	22	0	0	„			
Lathwood, per cubic fathom.							
Petersburg	9	10	0	„	10	10	0
Riga, Memel, &c.	8	5	0	„	8	15	0

PRIME COST PRICE OF MATERIALS—*continued.*

The price per Petersburg Standard, and its equivalent per 120 12 ft. of various sizes.

Petersburg Standard.	120 12 feet.		
	3 in. by 9 in.	3 in. by 7 in.	2½ in. by 7 in.
£ s. d.	£ s. d.	£ s. d.	£ s. d.
0 5 0	0 8 2	0 6 5	0 5 3
5 0 0	8 3 8	6 7 3	5 6 1
6 0 0	9 16 4	7 12 9	6 7 4
7 0 0	11 9 1	8 18 2	7 8 6
8 0 0	13 1 10	10 3 8	8 9 9
9 0 0	14 14 7	11 9 1	9 10 11
10 0 0	16 3 7	12 14 7	10 12 1

OAK.

	per ft. cub.
	s. d.
Sawn to scantlings	6 0
In plates, sleepers, bond, &c.	6 9
Rough framed	7 6
Wrought and framed	8 0
In "proper" frames	9 6

OAK IN THICKNESSES, EXCLUSIVE OF FIXING.

	Inch.	1½ in.	2 in.	2½ in.
	s. d.	s. d.	s. d.	s. d.
Rough .. .. per ft. sup.	0 10	1 2½	1 6	1 10
Edges, shot .. „	0 11	1 3½	1 7	1 11
Framed .. .. „	1 3	1 8½	2 2	2 10
Wrought, one side, add „	0 2	—	—	—
Ploughed and tongued „	0 1½	—	—	—

Oak cleft pales, per score (4 ft. high) 6*s.* 3*d.*, (5 ft. high) 7*s.* 3*d.*, (6 ft. high) 9*s.*

Oak cleft pale fence, 4 ft. high, with 2 arris rails and oak posts 9 ft. apart, fixed complete, per ro lineal, 38*s.*

1½ oak gravel plank, 8 in. wide, per foot run, 8*d.*

Oak field gates, with wrought rails, 5-bar and braced, 9 ft. wide, with post, spurs and fastenings, &c., complete, each 50*s.*

PRIME COST PRICE OF MATERIALS—*continued.*

TIMBER MERCHANTS' PRICES.

Best dry yellow and white goods. For joinery and good general work.	d.	d.	d.
3 × 11 Yellow Plank .. .. per ft. run	7	$7\frac{1}{2}$	8
3 × 9 „ Deals.. .. .. „	5	$5\frac{1}{4}$	$5\frac{1}{2}$
$2\frac{1}{2}$ × 7 „ Battens .. .. „	3	$3\frac{1}{2}$	4
3 × 11 White Plank .. .. „	6	$6\frac{1}{2}$	7
3 × 9 „ Deals .. .. „	$4\frac{1}{2}$	$4\frac{3}{4}$	5
$2\frac{1}{2}$ × 7 „ Battens .. .. „	$2\frac{3}{4}$	3	$3\frac{1}{4}$

Common qualities.	d.		d.
3 × 11 Yellow Plank .. .. „	4	to	6
3 × 9 „ Deals .. .. „	3	„	$4\frac{1}{2}$
$2\frac{1}{2}$ × 7 „ Battens .. .. „	2	„	$2\frac{1}{2}$
3 × 11 White Plank .. .. „	4	„	$5\frac{1}{2}$
3 × 9 „ Deals .. .. „	3	„	4
$2\frac{1}{2}$ × 7 „ Battens .. .. „	2	„	$2\frac{1}{2}$

For Carcassing and Rough Purposes.	£	s.		£	s.
2 × 7 Yellow Battens .. per 120 as 12 ft.	10	10	to	13	10
$2\frac{1}{2}$ × $6\frac{1}{2}$ „ .. „	9	10	„	12	0
$2\frac{1}{2}$ × 7 „ .. „	12	10	„	14	10
$2\frac{1}{2}$ × $6\frac{1}{2}$ White Battens .. „	9	0	„	12	0
$2\frac{1}{2}$ × 7 „ .. „	12	10	„	15	0
2 × 7 „ .. „	10	10	„	14	0
3 × 11 Yellow Plank .. „	24	0	„	30	0
2 × 11 „ .. „	19	10	„	22	10
2 × 10 „ .. „	16	10	„	20	10
4 × 9 Yellow Deals .. „ as 3 in.	21	0	„	24	0
3 × 9 „ .. „	18	0	„	22	10
2 × 9 „ .. „	14	10	„	18	0
3 × 8 „ .. „	18	0	„	21	0
2 × 8 „ .. „	13	10	„	16	10
3 × 8 White Deals .. „	18	0	„	21	0
2 × 9 „ .. „	13	10	„	15	10

Dry Pine.	s.	d.		s.	d.
3 × 11 Best Pine Plank, as 12 × 3 × 11	10	6	and	11	0
„ Best Seconds „ „				7	6
„ Seconds „ „				6	6
„ Good Thirds „ „				5	6
„ Thirds „ „				4	6

PRIME COST PRICE OF MATERIALS—*continued.*

TIMBER MERCHANTS' PRICES—*continued.*

Spruce.	1st.		2nds.		3rds.	
	s.	d.	s.	d.	s.	d.
3 × 11 Spruce Plank, as 12 ft.	6	6	5	6	4	6
3 × 9 „ Deals „	4	6	3	9	3	3
3 × 7 „ Battens „	3	6	3	3	3	0

Flooring and Matching.	Per Square.							
	s.	d.	s.	d.	s.	d.	s.	d.
$1\frac{1}{4}$ in. Yellow Flooring ..	16	6	18	6	21	0	22	6
1 „ ..	14	0	15	6	17	6	18	6
$\frac{7}{8}$ „ ..	13	6	14	6	15	6	16	6
$\frac{3}{4}$ „ ..	12	6	13	6	14	6	—	
$\frac{7}{8}$ in. Yellow Matching ..	15	6	17	6	18	6	—	
$\frac{3}{4}$ „ ..	13	6	15	0	16	6	—	
$\frac{5}{8}$ „ ..	12	6	13	6	14	6	15	6
$\frac{1}{2}$ „ ..	10	6	11	6	12	6	—	
$1\frac{1}{4}$ in. White Matching ..	17	6	18	6	20	0	—	
1 „ ..	14	0	15	6	16	6	17	6
$\frac{7}{8}$ „ ..	13	6	14	6	15	6	—	
$\frac{3}{4}$ „ ..	12	6	13	6	14	6	—	
$\frac{7}{8}$ „ ..	15	6	17	6	18	6	—	
$\frac{3}{4}$ „ ..	13	6	14	6	15	6	—	
$\frac{5}{8}$ „ ..	12	6	13	6	14	6	—	
$\frac{1}{2}$ „ ..	10	6	11	6	12	6	—	

		£	s.	d.
Poles	per ft. run	0	0	3
		0	0	$3\frac{1}{2}$
„ 22 ft.	each	0	3	0
Putlogs	per dozen	0	13	6
Rickers	each	0	1	6
Single Laths	per load	1	12	0
Double Laths	„	3	5	0

		s.	d.	s.	d.	s.	d.
Blind Laths	per bundle	10	0	11	0	11	6
Slating	„	—		3	6	4	0
Pantile	„	2	0	2	3	2	6
Crate	„	—		3	0	3	6
Trellis	„	2	6	—		—	

$\frac{3}{4}$ + 3 Palings, $4\frac{1}{2}$ fts. 14*s.* per 120. 4 fts. 13*s.*
Trellis Work, 7*d.* per ft. super. when closed, in heights from $1\frac{1}{2}$ to 8 ft., width $2\frac{1}{2}$ ft. (open to 12 ft. wide).

Wainscot and Honduras Mahogany.

	$\frac{1}{2}$ in.		$\frac{3}{4}$ in.		1 in.		$1\frac{1}{4}$ in.		$1\frac{1}{2}$ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Rough (including waste) per ft. sup.	0	10	1	0	1	$1\frac{1}{2}$	1	7	1	11	2	7
Rough (including labour and nails, add	0	2	0	2	0	$2\frac{1}{2}$	0	3	0	3	0	$3\frac{1}{2}$
Wrought, one side, add	0	$2\frac{1}{4}$	0	$2\frac{1}{4}$	0	$2\frac{3}{4}$	0	$2\frac{3}{4}$	0	$2\frac{3}{4}$	0	$3\frac{1}{2}$
„ both sides „	0	$4\frac{1}{4}$	0	$4\frac{1}{4}$	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$	0	$5\frac{1}{2}$
Ploughed and tongued „	—		0	1	0	1	0	1	0	1	0	$1\frac{1}{4}$
Framed, add	—		0	5	0	5	0	$5\frac{1}{2}$	0	6	0	7
Fixed „	0	1	0	1	0	1	0	$1\frac{1}{4}$	0	$1\frac{1}{4}$	0	$1\frac{1}{2}$

Fir.

		£	s.	d.
Prime cost	per load	4	15	0
Sawing and cartage, extra ..		1	0	0
Sawn to scantlings	per cube foot	0	2	10
In plates, lintels, bond, &c. ..	„	0	3	3
Rough framed in floors, roofs, &c.	„	0	3	9
Wrought and framed	„	0	4	0
„ in "proper" frames	„	0	5	0
Planing on sawn fir	per ft. sup.	0	0	$0\frac{3}{4}$

Centering.

		s.	d.
To vaults on 3-in. ribs with $\frac{3}{4}$-in. boarding, including fixing, striking, and removing, for use and waste only	per square	25	0
Moving and refixing		6	0
To brick-trimmers, &c.	per ft. sup.	0	8
To gauged arches with struts ..	„ run	0	8

Planking and strutting to foundations, average depth 8 ft., per foot run, 1*s*. 6*d*.

Roofing.

Labour and Nails only—per square.

	s.	d.
Common shed, one story high	4	6
„ three stories	6	6
Cottage roof	8	6
Span roof, with principals (9 ft. apart), collars, purlins, plates, and ridge	13	0
Span roof, with principals (9 ft. apart), tie beams, king posts, purlins, braces, and common rafters	17	6
Wall plates, lintels, &c. .. at per foot cube	0	5

Battening.

All Materials—per square.

	s.	d.
$2\frac{1}{4}$ in. × 1 in. for Countess slating	9	6
„ „ for walls 12 in. apart	10	0
Tilting fillets .. .. per foot run	0	2

Gutters, &c.

	$\frac{3}{4}$ in.		1 in.		$1\frac{1}{4}$ in.	
	s.	d.	s.	d.	s.	d.
Deal gutters and bearers per ft. sup.	0	6	0	8	0	10
Feather-edged lear-boards „	0	4	0	5	0	6
Extra for rebated drips .. .. each	—		—		0	4
„ for cesspools .. .. .. „	—		—		1	6

Hip and ridge roll, per foot run, 3*d.*

Bracketing.

Including plugging.

	s.	d.
To coves and cornices . .. .. per ft. super.	0	$7\frac{1}{2}$
„ „ circular add „	0	4
„ waggon head ceilings	0	6

LABOUR AND NAILS ONLY.
Quarter partitions and floors.

		s.	d.
Ceiling joists notched on plates ..	per square	5	0
Quarter partitions, 4-in. framed and braced	„	7	0
Quarter partitions, circular on plan add	„	2	0
Single-framed floors trimmed to fireplaces, stairs, &c.	„	9	6
Ground floors bedded, not framed	„	5	0
„ framed to chimneys, &c.	„	7	9
Herring-bone strutting	per ft. run	0	3

JOINER.

DEAL BOARDING AND FLOORING.
All Materials per Square.

	¾ in.		1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Rough	18	0	24	0	30	0	36	0
„ edges shot	20	0	26	0	33	0	39	0
„ ploughed and tongued	23	0	30	0	38	0	44	0

Sound boarding on fillets, 21*s.*; if herring-boned, add 1*s.* 6*d.* Weather boarding, measured on face, 4 boards out of 3-in. deal rough, per square, 30*s.*

	1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.
Wrought, one side tongued and beaded	34	0	44	0	50	0
White deal wrought and laid folding	32	0	40	0	46	0
Yellow, wrought and laid folding	35	0	43	0	53	0
If ploughed and tongued add per square	5	0	5	0	6	6
If tongued with iron „	6	0	6	0	6	0
If listed..	3	6	3	6	3	6

Mitred margins per foot run, 8*d.*

		1 in.		1½ in.	
		s.	d.	s.	d.
Batten floors, wrought and laid folding	per square	32	0	36	0
Straight joint wainscot ..	„	135	0	172	0
If dowelled, add	„	18	0	18	0
Barn floors 2-in. oak, listed and dowelled with oak pins	„	..	..	104	0
Warehouse floors, 1½-in. wrought and folding, deal	„	..	..	45	0

London-made Parquet Flooring.

(Exclusive of laying.)

		Per ft. Sup.
		s. d.
Solid deal interlaced	1 inch thick	0 9
„ deal and cherry	„	1 0
„ oak interlaced	„	1 9
„ oak and walnut	„	2 3
„ „ and sycamore	„	2 9
„ „ maple, and mahogany	„	3s. to 4s.
Rich patterns	„	4s. to 9s.
Setting out and laying	„	0 10
If French polished, add	„	0 3

Veneered parquet floor, one-fourth less.

Hawksley's Patent Stair Treads,

As used at Metropolitan Railway Stations.

Made of cubes of hard wood, per ft. super., 4*s.* 2*d.*

White's Wood Block Flooring.—For churches, schools, &c. (Exclusive of laying).

	1¼ in. thick.			1¾ in. thick.			2 in. thick.			2½ in. thick.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Quality A..	1	10	6	1	14	0	1	18	6	2	9	0
„ B..	2	5	0	2	10	0	2	15	0	3	7	0
„ C..	2	18	0	3	3	0	3	8	0	—		

A. Ordinary pattern from rough deals, prepared from common yellow deals.

B. Ditto, wrought upper face, prepared from second yellow deals.

C. Ditto, wrought upper face and joints, and prepared from first yellow deals.

Deal Fixed and Fitted—per ft. super.

	½ in.		¾ in.		1 in.		1¼ in.		1½ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	.
Rough, including labour and nails	0	3½	0	4	0	4½	0	5½	0	6½	0	8	0	10
Do. with edges shot ..	0	3½	0	4½	0	5	0	6	0	7	0	8½	0	11
Wrought, one side	0	4½	0	5	0	5½	0	6½	0	8	0	9½	1	0
Do. both sides	0	5½	0	6	0	6½	0	7½	0	9½	0	10½	1	1
Do. grooved and tongued	0	6	0	6½	0	7	0	8½	0	10½	0	11½	1	2
Do. framed, keyed, and clamped	—		0	8½	0	9½	0	10½	1	0	1	1½	1	4½
Do. mortise clamped ..	—		0	9	0	10½	0	11½	1	1	1	2	1	6
If with bearers .. add	0	1	0	1¼	0	2	0	2	0	3	0	4	0	5
If plugged to walls.. „	0	1	0	1	0	1¼	0	2	0	2	0	2	0	2
If beaded, one side .. „	0	0½	0	0½	0	0¾	0	1	0	1	0	1	0	1
If ledged .. .. .. „	0	1½	0	1½	0	2	0	3	0	3	0	4	0	4
If dovetailed .. .. „	0	1½	0	2	0	2	0	3	0	3½	0	3½	0	4
If mitred, add each mitre	0	5	0	5	0	5	0	5	0	7	0	8	0	8
If feather-tongued	—		—		0	1	0	1	0	1	0	1	0	1½
If clean deal in dresser tops	—		—		—		0	1	0	1	0	1½	0	1½

Skylights—per ft. super.

	1½ in.		2 in.	
	s.	d.	s.	d.
Deal ovolo or bevelled bar	0	10	1	0
For every half inch extra thickness add per ft. sup.	0	3	0	3

Sashes, Frames, and Casements—per ft. super.

	Deal Sashes.				Wainscot or Honduras Sashes			
	1½ in.		2 in.		1½ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Deal-cased frames, oak-sunk and weathered sills, ovolo sashes, brass-cased pulleys, best flax lines and iron weights single hung ..	1	6	1	9	2	9	3	3
If double hung, add per foot	0	2	0	2	0	3	0	3
Circular head, measured square	3	0	3	6	5	0	5	6
Circular on plan, add per ft.	1	0	1	6	2	0	2	0
If astragal and hollow sashes, add	0	1	0	1	0	2	0	2
If lamb's tongue or other special moulding, add per foot	0	2	0	2	0	3	0	3
Marginal bars, extra per foot run	0	1½	0	2	0	2	0	2
Frames, &c., as described above, for Venetian windows	2	0	2	6	3	3	3	9
Casements, including fir "proper" frames, oak-sunk w. and t. sills, but no butts	1	9	2	0	3	3	3	9
	2 in.		2½ in.		2 in.		2½ in.	
Sashes only for shop windows, ovolo	1	0	1	2	1	6½	1	9
Circular on plan	1	6	1	10	2	1	2	6
If astragal and hollow, add per foot	0	2	0	2	0	3	0	3
If lamb's tongue or special moulding	0	4	0	4	0	5	0	5
Cant bar, per foot run	1	0	1	0	1	6	1	6
Moulded horns, each	0	7	0	7	0	10	0	10

Venetian blinds, painted and fixed complete, per foot super., 9*d.* to 1*s.*

FANLIGHTS—per ft. super.

	1½ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.
Deal square framed	1	0	1	2	1	4
„ semi-head measured square ..	2	0	2	2	2	4

SKIRTINGS, INCLUDING BACKINGS—per ft. super.

	¾ in.		1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Square	0	7	0	8	0	9	0	10
Torus or single moulded ..	0	8	0	10	1	0	1	2

If rebated to form double plinth, add per foot, 2*d.*
If raking to steps .. .. .. „ 1*d.*
If plugged to walls .. .. .. „ 1½*d.*
If scribed .. .. „ 1½*d.*
Narrow skirting grounds .. .. per foot run, 2*d.*

BACKS, ELBOWS, SOFFITS—per ft. super.

	1 in.		1¼ in.	
	s.	d.	s.	d.
Deal plain keyed	0	11	1	1
Square framed	1	0	1	2
Moulded or bead butt	—		1	4
Fancy moulded	—		1	6
Soffit, square framed, circular one edge	—		1	9
„ moulded or bead butt	—		1	9
„ fancy moulded	—		2	6
„ circular, two edges	—		2	6
If splayed, add per foot	—		0	3
Plain circular soffit, canvas-backed ..	—		3	6
Semicircular moulded soffit, 2 panels..	—		5	6

Capping to backs .. .. per foot run, 2*d.*
Add, if tongued .. .. „ 0½*d.*
Tongued elbow capping 8*d.*

Back Linings—per ft. super.

	1 in.		1¼ in.	
	s.	d.	s.	d.
Deal, 2 or 3 panel square	0	10	1	0
,, bead butt, or 4-panel square ..	1	0	1	2
,, 4 panel and bead butt	1	1	1	3
For extra panel, add per foot	0	1	0	1
If splayed ,, ...	0	1	0	1

Boxings—per ft. super.

	1 in.		1¼ in.	
	s.	d.	s.	d.
Deal, splayed	0	10	1	0
,, proper boxings	0	11	1	2
,, circular on plan	—		1	9
,, for sliding shutters double hung with pulleys, beads, fillets, &c. ..	1	0	1	2

Boxing Shutters—per ft. super.

	¾ in.		1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Deal clamped flaps hung in one height	0	9	0	11	1	0	1	1½
Two-panel square ditto ..	—		1	1	1	2½	1	4
Bead butt or moulded, one side, ditto	—		1	2	1	3½	1	5
If hung in two heights add per foot	—		0	1	0	1	0	1
Four-panel square in two heights	—		1	3	1	4½	1	5½
Ditto, moulded one side ..	—		1	5	1	6½	1	7½
For extra panel, add per foot	—		0	1	—		0	1
If splayed .. ,,	—		0	1	—		0	1

SLIDING SHUTTERS—per ft. super.

Including lines, weights, &c.

	1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.
Deal, two-panel square	1	0	1	2	1	4
Ditto, moulded or bead butt one side	1	1	1	3	1	5
Ditto, bead flush and square	1	2	1	4	1	6
If hung with lead weights, add per ft.	0	2	0	2	0	2

SHOP SHUTTERS—per ft. super.

	s.	d.
1¼ bead butt and square shop shutters..	1	3
1½ bead butt and moulded	1	9
2¼ moulded stall board	1	4

PATENT REVOLVING SHUTTERS.

	s.	d.		s.	d.
Wood, fixed complete	1	6	to	2	0
Wood, and iron edge, complete	3	0	,,	—	
Flat laths, iron and all gearing	4	0	,,	—	
Self-coiling, steel	3	0	,,	4	6
Mahogany or oak	3	6	,,	6	6

Space occupied by Revolving Shutters.

Sight Height of Shutter.	Diameter of Curvilinear and Interlocking Iron Shutters.	Diameter of Wood and Iron Flat Lath Shutters.
5 feet	6¾ inches	9¼ inches
8 ,,	8 ,,	11 ,,
10 ,,	9 ,,	12¼ ,,
15 ,,	10¾ ,,	14¾ ,,
20 ,,	13 ,,	17 ,,

The above is net size of shutters. 1 to 2 inches clearance should be allowed.

Doors—per ft. super.

	Deal.										Wainscot and Honduras.			
	¾ in.		1 in.		1¼ in.		1½ in.		2 in.		1½ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Rough ledged, edges shot	0	7	0	8	0	9	0	10	—		—		—	
Wrought ditto	0	8	0	9	0	10	1	0	—		—		—	
Matched and beaded..	0	9	0	10	1	0	1	1	—		—		—	
Ploughed, tongued, and beaded	—		0	10	0	11	1	1	—		—		—	
If braced, add	0	2	0	2	0	2	0	2	—		—		—	
Two or three panel sqr.	—		0	10	0	11	1	0	1	1	—		—	
Four-panel square ..	—		1	0	1	1	1	2	1	3	2	10	3	8
Ditto, moulded or bead butt one side	—		1	2	1	3	1	4	1	6	3	2	4	0
Six-panel square ..	—		—		—		1	3	1	5	3	4	4	0
Ditto, moulded one side	—		—		—		1	6	1	8	3	7	4	3
Ditto, bead flush and square	—		—		—		1	7	1	9	3	8	4	4
Ditto, moulded both sides	—		—		—		1	8	1	10	3	10	4	6
Framed, braced, and filled in with 1-in. ploughed and tongued boards	—		—		—		—		2	0	—		—	
Wrought, ploughed, and tongued cellar flaps	—		—		—		1	5	1	8	—		—	

For Spanish mahogany add 80 per cent. to price of Honduras.

Cupboards and Dressers—per ft. super.

Measured on Face.

	s.	d.
1-in. deal tops, square skirting ¾-in. shelf, 1¼-in. moulded and square folding doors hung to beaded frame	1	4
2-in. tops, 3 shelves, 3 drawers, pot-boards, framed legs and ends, 1 ft. 6 in. deep	1	6

SASH DOORS—per ft. super.

	Deal.				Wainscot and Honduras.			
	1½ in.		2 in.		1½ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Ovolo two-panel square • ..	1	0	1	2	2	9	3	3
Ditto, and moulded or bead butt one side	1	1	1	3	3	2	3	9
Ditto and ditto, both sides..	1	3	1	5	3	3	4	0
If diminished styles .. add	0	1	0	1	0	2	0	2
If lamb's tongue .. .. „	0	1½	0	1½	0	2	0	2
If hung folding .. .. „	0	2	0	2	0	3	0	3
If with marginal lights „	0	2	0	2	0	3	0	3

JAMB LININGS—per ft. super.

	¾ in.	1 in.	1¼ in.	1½ in.
	s. d.	s. d.	s. d.	s. d.
Deal, single rebated	—	0 9	0 10½	0 11½
Ditto, and beaded..	—	0 10½	0 11	1 0
Ditto, double rebated	—	0 11	1 0	1 1
Ditto, and beaded..	—	0 11½	1 1	1 2
Two-panel, single rebated ..	—	—	1 0	1 1
Ditto, and moulded	—	—	1 1	1 3
If double rebated .. add	—	—	0 1	0 1
If plugged to walls .. „	—	—	0 1	0 1
If splayed .. .. .. „	—	—	0 1	0 1
Framed grounds per ft. sup.	0 7	0 8	0 9	0 11

WALL LININGS AND PARTITIONS—per ft. super.

	1 in.	1¼ in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Square framed	0 8	0 9	0 10½	1 0
Moulded one side	0 10	1 0	1 1½	1 2½
Ditto, two sides	1 0	1 2	1 3½	1 4½

WATER-CLOSETS—per ft. super.

	Deal.		Honduras.	
	1 in.	1¼ in.	1 in.	1¼ in.
	s. d.	s. d.	s. d.	s. d.
Tongued seat-riser and bearers	0 9	0 10½	2 5	2 9
Ditto, framed and beaded with clamped flap	0 11	1 0	2 11	3 3
Cutting and dishing holes, each	1 0	1 0	1 6	1 6
Ditto, for pull, including beads .. ..each	—	—	2 0	2 0

STAIRCASES—per ft. super.

	1 in.	1¼ in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Wrought deal treads, risers, and carriages	1 0	1 2	—	—
Ditto, glued and blocked with moulded nosings	1 2	1 4	—	—
Ditto, with returned nosings	1 3	1 7	—	—
Add on winders	0 1½	0 2	—	—
Plain cut brackets, each, 1*s.* 2*d.*				
Housings to step and riser, each, 10*d.*				
Plain wall string and plugging	0 9	0 10	1 1	1 4
Ditto, writhed	3 10	4 8	5 8	6 6
Moulded ditto .. .. add	0 2	—	—	—
Ditto, writhed .. .. ,,	0 4	—	—	—
Framed, rebated, and beaded outer string	0 10	0 11	1 2	—
Ditto, sunk and beaded ..	1 0	1 1	1 4	—
Ditto, moulded	1 2	1 3	1 6	—

MOULDINGS—per ft. super.

	s. d.
Straight, worked by hand	1 3
Circular on plan, ditto	2 0
Ditto, heads, ditto	3 7
Ditto, two ways, ditto	9 0

MOULDINGS UNDER 4-IN. GIRTH—per yard run.

	½ in.		⅝ in.		¾ in.		⅞ in.		1 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Common o.g.	0	1½	0	2½	0	3	0	3½	0	4
Quirked ditto	0	1¾	0	3	0	3½	0	4	0	5
Quirk ovolo and bead	0	2	0	3½	0	4	0	4½	0	6

HANDRAILS—per ft. run.

	Deal.		Oak or Honduras.		Spanish Mahogany.	
	s.	d.	s.	d.	s.	d.
Moulded, 2½ in. × 2 in. ..	1	0	2	0	3	6
Grooved for balusters	1	1	2	1	3	9
Ramped	2	3	3	10	5	4
Swan-neck	3	0	5	0	7	4
Solid writhed..	4	8	10	0	13	6
Scroll to curtail step	—		10	0	14	6

Birch twice the price of deal.

French polishing rail .. .. per foot run 6*d.*
Balusters, 1 in. square bar.. .. „ 2*d.*
Turning extra, from 6*d.* each.

SUNDRIES.

		s.	d.
Cut brackets for shelves, 9 in. wide ..	each	1	0
Ditto, moulded ditto	„	2	0
Cloak pegs and turning	„	0	6
Small deal paper boxes	„	3	0
Fixing cupboard locks or latches	„	0	10
Ditto deadlocks	„	0	11
Ditto mortise locks	„	3	0
Ditto patent sash fasteners	„	0	9
Ditto common bolts	„	0	5
Ditto shutter bars	„	1	0
Towel rollers and brackets	„	5	0
Harness pegs in hard wood	„	0	9
Saddle brackets	„	20	0
Sash line	per yd.	0	1
Sash weights (iron)	per lb.	0	1½
Ditto (lead)	„	0	3
White lead	„	0	4
Pitch	„	0	1
Tar..	per gall.	0	8

STEAM-MADE JOINERY.

Prices at the Warehouse in London.

Deal.	Per 100 foot run.
	s. d.
5 in. × 3½ in. rebated and double-beaded door frame	38 6
4½ in. × 2¾ in. ditto	26 5
3½ in. × 1½ in. architrave moulding	12 0
3 in. × ⅞ in. ditto	7 9
2 in. × 1 in. ditto, moulding	6 7
1 in. × ½ in. panel moulding	2 11
6½ in. × 1½ in. architrave	31 0
8½ in. × 2 in. ditto	46 0
4 in. × ⅝ in. torus or moulded skirting	9 0
7 in. × ¾ in. torus skirting	16 0
7 in. × 1 in. moulded ditto	19 0
11 in. × 1 in. moulded and sank	30 0
	per ft. sup.
Double hung sashes and frames complete	8*d*. to 10*d*.

		s. d. s. d.
1½-in. four-panelled square framed doors, 6 ft. 7 in. × 2 ft. 7 in. ..	each	7 11 to 0 0
2-in. ditto, ditto	„	11 6 „ 12 7
1½-in. four-panel bead butt or flush doors, 6 ft. 8 in. × 2 ft. 8 in. ..	„	11 10 „ 13 2
2-in. ditto, ditto	„	18 5 „ 20 0
2-in. four-panel moulded doors, 7 ft. × 3 ft.	„	19 3 „ 22 10
1½-in. sash doors, ditto..	„	17 4 „ 18 8
2-in. ditto, ditto	„	19 3 „ 20 4
Jamb linings, 4½ in. × 1 in. to 6½ in. × 1½ in.	„	10 6 „ 20 0

	Per ft. Sup.
	s. d.
Trellis work..	0 7
	for each 9-ft. length.
Fence posts, 9 ft. apart, 3 rails and upright bars, height 4 ft.	13 6
Ditto, ditto, height 3 ft. 6 in.	11 0

Greenhouses Complete.

Including fixing, sashes 2 in. thick, glazed with 16-oz. sheet glass.

	£	s.	d.
Lean-to houses, 15 ft. × 6 ft.	16	10	0
,, ,, 20 ft. × 10 ft.	30	10	0
,, ,, 30 ft. × 12 ft.	48	0	0
,, ,, 50 ft. × 14 ft.	76	0	0
Span houses, 15 ft. × 12 ft.	33	0	0
,, ,, 20 ft. × 16 ft.	49	10	0
,, ,, 30 ft. × 20 ft.	76	0	0
,, ,, 50 ft. × 20 ft.	114	0	0

Prime Cost Prices of Sawing.

		Battens.		Deals.		Planks.	
		s.	d.	s.	d.	s.	d.
6 feet	per dozen cuts.	1	6	1	6	2	0
7 ,, ...	,,	1	8	1	9	2	3
8 ,, ...	,,	1	9	2	0	2	6
9 ,, ...	,,	1	10	2	2	2	9
10 ,, ...	,,	2	0	2	4	3	0
11 ,, ...	,,	2	0	2	6	3	3
12 ,, ...	,,	2	3	2	10	3	6
13 ,, ...	,,	2	6	3	3	3	9
14 ,, ...	,,	2	6	3	4	4	3
15 ,, ...	,,	2	8	3	8	4	9
16 ,, ...	,,	2	10	3	10	5	0
17 ,, ...	,,	3	0	4	2	5	6
18 ,, ...	,,	3	2	4	4	5	9
19 ,, ...	,,	3	4	4	6	6	3
20 ,, ...	,,	3	6	4	10	6	6
21 ,, ...	,,	3	10	5	1	7	0
22 ,, ...	,,	4	0	5	4	7	4
23 ,, ...	,,	4	2	5	7	7	8
24 ,, ...	,,	4	4	5	10	8	0

Feather-edged sawing, one-third extra.

Flatting, 3 inches and under .. .. per 100 ft. run 1*s.*
,, 4 ,, ... ,, 1*s.* 6*d.*

Deal School Fittings.

		s. d.
Plain desk..	per ft. run	1 5
Standards to ditto	each	2 8
Seat	per ft. run	0 8
Standard to ditto	each	1 5
Blocks for ditto	"	0 10
Double desk	per ft. run	3 0
Standards and block	each	5 3
Seats with back rails	per ft. run	2 2 to 3 6

"London" and other pattern School Fittings, including Desk-top, 14 in. wide; shelf, 7 in.; seat, 9 in.; two standards to each:

	Stained Deal.			Pitch Pine.		
	s. d.		s. d.	s. d.		s. d.
2 ft. long, for one scholar each	19 0	to	23 0	20 0	to	25 0
3 ft. 4 in. long, for two scholars .. ..each	21 0	,,	25 0	22 6	,,	28 0
6 ft. long .. .. "	26 0	,,	30 6	28 0	,,	32 0
Three standards each						
9 ft. long	34 0	,,	45 9	37 0	,,	48 0
12 ft. ,, ...	47 0	,,	52 0	51 0	,,	55 0

		9 in. wide.	11 in. wide.
		s. d.	s. d.
Stained deal forms—			
With single rail	per foot	1 0	1 2
,, double rail	,,	1 2	1 4

Lecture Hall seats—		
Deal, stained and varnished	per foot	1 6
Pitch pine, varnished..	,,	1 9
Standards	each	4 0
Screws ditto	,,	0 4

IRONMONGER.

		$\frac{3}{4}$ in.	1 in.	$1\frac{1}{4}$ in.	$1\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	2 in.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Screws, iron ..	per doz.	0 1	0 2	0 3	0 4	0 $4\frac{1}{2}$	0 6
Ditto, brass ..	"	0 3	0 5	0 7	0 8	0 9	0 10

	Per Pair.							
	1 in.	$1\frac{1}{4}$ in.	$1\frac{1}{2}$ in.	2 in.	$2\frac{1}{2}$ in.	3 in.	4 in.	5 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Hinges, including screws, cast iron	0 2	0 3	0 4	0 6	0 8	0 9	1 0	2 0
Ditto, wrought iron	0 3	0 4	0 6	0 8	0 10	1 0	1 9	3 0
Ditto, brass ..	0 6	0 8	0 9	1 0	1 6	2 0	4 0	8 0
Brass rising bolts	—	—	—	—	—	10 0	14 0	18 0

PRIME COST DOOR SPRINGS AND HINGES.

	Iron.		Brass.	
	s.	d.	s.	d.
Springs, 3 in.	13	6	22	0
" 4 in.	18	0	29	0
" 5 in.	24	0	38	0
" 6 in.	30	0	47	0
Hinges, single action, 3 in.	13	0	27	0
" " 4 in.	17	6	36	0
" " 5 in.	22	0	44	0
" " 6 in.	27	6	52	0

Cross garnets, 10 in., 9*d.*; 16 in., 1*s.* 8*d.*; 20 in., 2*s.* 6*d.* per pair.
Parliament, $3\frac{1}{2}$ in., 1*s.* 9*d.*; 4 in., 2*s.*; 5 in., 2*s.* 6*d.* per pair.
Collinge's patent, 18 in., 7*s.*; 24 in., 10*s.*; 30 in., 13*s.* per pair; not fixed, 4 ft. long, 27*s.*
Door locks, iron rim, 4 in., 2*s.* 3*d.*; 5 in., 2*s.* 6*d.*; 6 in., 3*s.* 3*d.* each, and fixing.
Ditto, Mortise, 6 in., 8*s.*; 7 in., 13*s.*, fixed.
Wedge Casement Stays, 12 in. arm, 2*s.* 6*d.* each fixed.
Deadlocks (rim), 4 in., 2*s.*; 5 in., 2*s.* 6*d.*; 6 in., 3*s.*; 8 in., 5*s.* 6*d*
Padlocks (brass), Hobbs and Co.'s, 1 in., 3 lever, each 4*s.* 6*d.*

Padlocks (iron), Hobbs and Co.'s, 2 in., 3 lever, each 3*s*. 6*d*., extra for galvanized iron, 6*d*. each.
Desk locks, 2½ in., 7*s*. 6*d*.; 3 in., 7*s*. 6*d*.
Drawback locks, 8 in., 5*s*. 6*d*.; 9 in., 7*s*.; 10 in., 8*s*.
Stock locks (wood), 7 in., 1*s*. 6*d*.; 8 in., 1*s*. 9*d*.; 9 in., 2*s*. 10 in., 2*s*. 9*d*.
Bolts, iron, 3 in., 4*d*.; 6 in., 8*d*.; 10 in., 1*s*. 6*d*., fixed.
Espagnolette, ditto, 3*s*. 3*d*. to 4*s*. per foot run; nett cost, add profit and fixing.
Shutter bar with bow latches, per inch in length, 1½*d*.
Plain brass knobs and roses, each, 3*d*.
Brass flush rings, each, 6*d*.
Common sash fasteners, each, 1*s*.; strong patent, 7*s*. 6*d*.
Flax line per yard, 1*d*.

		Fixing, extra. *s*.	*d*.
A. Smith's double-action Door Spring ..	each	35	0
Ditto, extra large, for clubs and banks ..	,,	63	0
Weather-tight bars for stone sills or steps, 1 ft. 6 in. long	per foot	7	6
3 ft. long..	,,	6	0
6 ft. ,, ...	,,	4	6
Ditto, water-tight fastenings—			
4 ft. long.. ,.	,,	7	0
6 ft. ,, ...	,,	6	0
10 ft. ,, ...	,,	4	9

		Prime cost, exclusive of fixing. *s*.	*d*.	Fixed, each. *s*.	*d*.
3½ in. iron rim Latch, with Furniture	per doz.	14	6	..	
Ditto, with Mortise	,,	15	6	..	
6 in. rim Lock, fitted with brass, Furniture ..	,,	37	6	..	
4 in. Mortise Lock, 2 bolt, without Furniture ..	,,	24	0	..	
6 in. superior made Mortise Locks, with gun-metal bolts, each ..	from	12	6	..	

Tonk's patent brass door Furniture, 3*s*. 9*d*. to 7*s*. 10*d*. each set.
,, china ,, 3*s*. 7*d*. ,, 6*s*. 0*d*. ,,
,, oak, &c. ,, 4*s*. 8*d*. ,, 10*s*. 0*d*. ,,
,, glass ,, 9*s*. 0*d*. ,, 18*s*. 0*d*. ,,

Door Furniture.

	Per dozen sets. s. d.		s. d.
Mace's patent brass rim Furniture ..	13 6	to	20 0
Ditto, Mortise	20 0	„	25 0
	Per two bolt set.		
Pugh's patent brass rim Furniture..	2 6	to	3 0
Ditto, Mortise	3 0	„	3 9
„ China, plain white ..	3 2	„	3 6
„ „ black	3 6	„	3 10
„ white with gold lines.	4 0	„	4 4
„ black	4 4	„	4 8
Ditto, plain ebony or oak	4 4	„	5 0
	Per dozen sets.		
Patent self-adjusting, white	20 0	to	33 0
„ „ buff and black	21 0	„	36 0
„ „ white or black and gold ..	28 0	„	39 0

		s. d.
Hookham's patent steel ribbon Sash Line—		
Breaking strain, 3 cwt.	per foot	0 2
„ 4½ cwt.	„	0 3
„ 7 cwt.	„	0 4
Gothic drop-ring Handle, each	from	2 0
„ Latch or Bolt	„	4 6
Brass perforated Finger Plates	„	12 6
„ art design..	„	20 0

Ventilators.

Sherringham's, iron.. ..	9×3	4s. 0d.	9×6	5s. 6d.
	14×6	7s. 0d.		
Arnott's, iron	11×8	5s. 6d.	16×9	8s. 9d.
Iron, sliding	8×6	2s. 10d.	18×6	5s. 3d.
„ round or square ..	9 in.	3s. 2d.	18 in.	9s. 4d.
Cottam's Ventilating Box .	9×6	3s. 6d.	13½×9½	7s. 6d.
Boyle's Turret Ventilator.	4 in. Diameter.	30s. 0d.	8 in. Diameter.	55s. 0d.
Archimedean Screw ditto.	9 in.	32s. 0d.	12 in.	50s. 0d.
	18 in.	95s. 0d.	30 in.	£9 10s.
	48 in.	£18 10s.		

Glass Ventilators.—See "Glazier," page 383.

FELTS, prime cost, exclusive of Fixing.

	s.	d.
Patent Asphalte Roofing Felt .. per square foot	0	1
„ „ Sarking ditto .. „	0	0¾
„ Bituminous Inodorous do. „	0	1
„ Black Ship Sheathing do., pr. sheet, 32×20	0	2½
„ Brown ditto .. .. .. „	0	3
„ Black Hair ditto .. .. „	0	3½
„ Brown Hair ditto .. .. „	0	4
Boiler or Dry Hair Felt, in sheets, 32 in. × 20 in.		
No 1, weighing 16 ounces per sheet	0	7
No. 2, „ 24 „ „	0	9
No. 3, „ 32 „ „	0	11
No. 4, „ 40 „ „	1	1
No. 5, „ 48 „ „	1	3
Ditto, in rolls, 20 yards long by 34 in. wide.		
No. 0, weighing about 30 lbs. per piece .. .. } per lineal yard	1	0
No. 1, „ „ 42 „ „	1	1
No. 2, „ „ 62 „ „	1	3
No. 3, „ „ 85 „ „	1	11

SLATER.

SLATING ROOFS.

	Per Square.					
	With Zinc Nails.			With Copper Nails.		
	£	s.	d.	£	s.	d.
Ladies	2	0	0	2	2	0
Countess	2	3	0	2	5	0
Duchess	2	5	0	2	7	0
Queen's or rags	2	6	0	2	8	0
Imperials	2	8	0	2	10	0
Patent	2	5	0	2	7	0
Westmoreland	3	7	0	3	9	0

Circular work, ⅓rd more than the above prices.
Open or half slating, ⅕th less „ „

Slating Stripped and Relaid.

	Zinc Nails.		Copper Nails.	
	s.	d.	s.	d.
Ladies .. .. .. per square	10	0	11	6
Countess	8	6	10	6
Duchess	8	0	10	0
Queen's or rags	12	0	14	0
Patent	13	0	15	0
Westmoreland	14	0	17	6

	Per Foot Run.	
	s.	d.
Patent slate ridge, 7-in. sides and 3-in. roll	2	1
Ditto, 5½-in. sides and 2-in. roll	1	3
Patent slate ridges and hips without roll, 5½-in. sides	0	6
Ditto, ditto, 7-in. sides	0	7

Slate Slabs under 5 ft. × 2 ft. 6 in.
(Exclusive of Fixing.)

	Per Foot Super.									
	½ in.		1 in.		1½ in.		2 in.		3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Slate slabs, unplaned	0	8	1	2	1	7	2	1	3	0
Add for fixing	0	2	0	2½	0	3	0	3½	0	5

Labour on Slate.

	s.	d.
Planing each face .. .. per foot super.	0	2
Sanding „	0	2

	¾ in.		1 in.		2 in.	
	s.	d.	s.	d.	s.	d.
Groove .. .. per foot run	0	2½	0	3	0	5
Rounded edge..	0	2½	0	3	0	5
Throating	0	1½	0	2	0	3
Filed edges	0	1½	0	2	0	4

Slate Sinks.

	Per Foot Super.
	s. d.
1 in. thick, 4 in. deep inside, or more, bolted as cisterns	2 0
Ditto, boxed and put together with screws	2 4

Slate Cisterns.

	Per Foot Super.			
	¾ in.	1 in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Grooved and fitted complete, with holes bored, exclusive of fixing	1 3	1 5	1 11	2 8
Fixing, extra	0 4	0 4	0 4½	0 5

Enamelled Slate Slabs. (Exclusive of Fixing.)

	Per Foot Super.	
	1 in. thick.	2 in. thick.
	s. d.	s. d.
Egyptian and other green marbles ..	2 8	4 4
Sienna, black and gold, &c.	3 2	5 0
Pebbles and rich marbles	4 0 to 6 0	6 0 to 8 0

Mouldings, 50 per cent. more than the above.

Lathe-turned Slate Columns.

Diameter	3 in.	4 in.	5 in.	6 in.	Not exceeding 5 yards long.
Per foot run	2/6	4/9	7/0	9/6	

Enamelled Slate Chimney-pieces.

From 17*s.* to 30*l.*, and upwards.

Enamelled Slate Urinals.

White, cream, and plain tints.

	Per Foot Super. s. d.
½-in. enamelled, one face	2 4
1-in. „ „	2 8
1 in. „ two faces	3 8

Slate Baths.

	£ s. d.
Plain form with inclined back .. .. each	3 15 0
„ „ enamelled „	5 5 0

Whitland Abbey Green Slates.

Laid to 3-in. lap with copper nails.

	Per Square. £ s. d.
24 in. × 12 in.	3 5 0
20 in. × 10 in.	2 10 0
18 in. × 10 in.	2 8 0
16 in. × 10 in.	2 7 0
14 in. × 8 in. and 12 in. × 6 in.	2 6 0

Green Slates—per thousand of 1200 on Wharf.

	Size.	Eureka. £ s. d.	Granular. £ s. d.
Small Duchess..	22 in. × 12 in.	21 15 0	19 15 0
Countess	20 in. × 10 in.	16 0 0	15 0 0
Small Countess	18 in. × 10 in.	13 17 6	12 10 0
Ladies	16 in. × 10 in.	12 5 0	10 15 0
Ladies, small ..	16 in. × 8 in.	..	8 12 6
	14 in. × 8 in.	..	7 0 0
	14 in. × 7 in.	7 0 0	
	11 in. × 5 in.	3 10 0	

RED, WHITE, BLUE, AND STRAWBERRY CRESTED RIDGE TILES
At railway station.

	s. d.
Plain tile 1 ft. long	0 7
Plain fillet, ditto	0 10
Crested	1/1 to 1/5
Plain red ridge tile	0 5

WHITLAND ABBEY GREEN SLATES.
Quarry Prices per M. of 1200.

Size.	Price. £ s. d.	Weight.	Surface.
24 in. × 12 in.	20 0 0	90 cwt.	1100 feet.
22 in. × 12 in.	16 10 0	80 ,,	950 ,,
20 in. × 10 in.	11 0 0	60 ,,	775 ,,
18 in. × 10 in.	8 15 0	54 ,,	675 ,,
18 in. × 9 in.	7 15 0	50 ,,	600 ,,
16 in. × 10 in.	7 15 0	50 ,,	600 ,,
16 in. × 8 in.	5 10 0	35 ,,	475 ,,
14 in. × 8 in.	4 0 0	30 ,,	400 ,,
14 in. × 7 in.	3 5 0	25 ,,	350 ,,
12 in. × 8 in.	2 15 0	25 ,,	350 ,,
12 in. × 7 in.	2 5 0	22 ,,	300 ,,
12 in. × 6 in.	1 15 0	18 ,,	250 ,,

Delivered in trucks at Narberth Road Station at 7*s.* per ton. Railway transit to Paddington, 13*s.* 4*d.* per ton.

TIME AND MATERIALS.

		s. d.
Slater	per hour	0 10
Labourer	,,	0 6½
Slate mason	,,	0 10½
Ladies slates with copper nails ..	per dozen.	2· 0
Countess ,, ,, ...		3 0
Duchess ,, ,, ...		4 2

APPROXIMATE NUMBER OF FEET IN A TON OF SLATE.

Thickness ..	¼ in.	⅜ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
Feet in a Ton.	300	200	150	120	100	75	60	50

Materials Prime Cost.

		s.	d.
Best blue and red slates, in London, 3 in. lap	per square	30	0
Best Welsh green	„	45	0
Slate cisterns	per gallon	0	5
Slate slabs, planed both sides and sawn all round:—			
1 in.	per sq. ft.	0	8
1½ in.	„	0	10
2 in.	„	1	0

TILER.

All Materials.

Pantiling.

		s.	d.
Pantiling laid dry to a 10-inch gauge	per square	27	0
Pointing outside, including fillets	add	4	0
Ditto inside only, ditto	„	6	0
Ditto both sides, ditto	„	10	0
Old pantiling, stripped and relaid		15	0
Heading	per foot run, add	0	3½
Hips and ridges	„ „	0	4½
Valley	per foot run	0	4
Filleting	„ „	0	1½
Ditto, in cement	„ „	0	2
Cutting to splays and hips	„ „	0	2
Painted hip-hooks	each	1	0
Ditto T nails	„	0	2

Plain Tiling, per Square.

		s.	d.
On double fir laths and wrought nails showing 4 inches on the face		45	0
Ditto on oak laths		48	0
Old plain tiling stripped, new fir laths, and retiled ..		22	0
Hips and ridge	per foot run	0	4
Plain tile valley	„	0	7
Irregular ditto	„	0	9
Grooved ridge with vertical ornament..	per foot run	1	3
Barge or verge filled in	„	0	2½
Cuttings	„	0	2
Flats, with three courses of plain tiles bedded solid with neat cement..	per yard sup.	7	0

Materials.		s.	d.
Pantiles	per 100	9	0
Plain tiles	,,	4	6
Ditto, $10\frac{1}{2} \times 6\frac{1}{2} \times \frac{5}{8}$	each	0	1
Pantiles, $13\frac{1}{2} \times 9\frac{1}{2} \times \frac{1}{2}$	,,	0	$1\frac{1}{2}$
Glass tiles	,,	1	4
Pantile laths	per bundle	3	6
Ditto, with nails	,,	4	0
Fir laths	,,	2	0
Double ditto	,,	3	9
Oak ditto	,,	4	6
Ditto with nails	,,	5	0
Tile heads	per basket	0	10
Hip-hooks and nails	each	1	0
T nails for hips and ridges	,,	0	3

Broomhall Company's Patent Tiles.

Battens.—Battens 3 in. × 1 in. or $\frac{3}{4}$ in. to about a 10-in. gauge.

Full Size Tiles.—185 tiles are fixed to 100 feet super. of roof (1000 tiles weigh about 2 tons).

Small Size ditto.—Small sized tiles are made for lodges, bay windows, &c., 333 to the 100 feet super.

Cost round London.—Full sized tiles, fixed complete, including cartage and labour:—

		£	s.	d.
Red Tiles .. .. at per square (100 feet super.)		£		
Ridge	per foot lineal	0	1	6
Hip		0	1	3

Patent Damp Course.

Blocks, 14 × 9 × 1 in.; 9 × 9 × 1 in.; $4\frac{1}{2}$ × 9 × 1 in. Angles extra. Weight about 1 ton to 250 feet super.

Blocks, 18 × 9 × $1\frac{1}{2}$ in.; 14 × 9 × $1\frac{1}{2}$ in.; 9 × 9 × $1\frac{1}{2}$ in.; $4\frac{1}{2}$ × 9 × $1\frac{1}{2}$ in.

Angles extra. Weight about 1 ton to 170 feet super.

Blocks, 18 × 9 × 3 in.; 14 × 9 × 3 in.; 9 × 9 × 3 in.; $4\frac{1}{2}$ × 9 × 3 in.

Angles extra. Weight about 1 ton to 130 feet super.

	At London.	At Tamworth.
Price, $2\frac{1}{2}$ in. thick, per foot super.	10*d.*	8*d.*
,, $1\frac{1}{2}$,, ,,	6*d.*	5*d.*
,, 1 ,, ,,	6*d.*	4*d.*

Tiles.

P. C. Prices, December 1876.

Blue Ridge Tiles.—Free in trucks or boats at the works, Potteries, Staffordshire.

	Wings in.	s.	d.
Plain, each	6	0	4
,,	7	0	4¾
Rolled top	6	0	5¾
,,	7	0	6½
Rolled capped	7	0	7½
Capped	6	0	4½
,,	7	0	4¾
,, angular	7	0	6
Pyramid ridge	7	1	2

Quarries or Flooring Tiles, per 1000.

	Blue and Red. £	s.	d.	Buff. £	s.	d.
Squares, 12 × 12 × 1½	14	10	0	17	0	0
,, 9 × 9 × 1½	5	12	6	7	12	6
,, 9 × 9 × 1¼	4	17	6	6	10	0
,, 7½ × 7½ × 1⅛	3	15	0	4	15	0
,, 6 × 6 × 1	2	9	0	3	5	0
,, 4½ × 4½ × ⅞	1	15	0	1	17	6
Octagons, 8 × 8 × 1½, including small squares of either colour for intersection	7	15	0	9	2	6
Oblongs, 9½ × 5 × 1¼	3	12	6	4	12	6
,, 9 × 4½ × 1	2	17	6	3	17	6
Hexagons 6 × 6 × ¾	3	0	0	3	5	0

Shropshire Roofing and Ridging Tiles.

Free in trucks or boats at the works, Broseley, in lots of four tons and upwards. Per 1000.

	s.	d.
Plain roofing tiles, blue, 10½ × 6¾	48	6
,, ,, brown ,,	43	6
Ornamental ,, blue ,,	52	6
,, ,, brown ,,	48	6

TILES. London Wharf Prices.

TERRO-METALLIC RIDGE TILES. 18 inches long.

	Wings.	Best.	Seconds.	Weight per 100 Tiles.
		Each.	Each.	
Plain ridges.. ..	6 in.	5¼*d.*	5*d.*	12 cwt.
Ditto..	7 „	6½*d.*	6*d.*	14 „
Capped ridges ..	6 „	6½*d.*	6*d.*	14 „
Ditto..	7 „	7½*d.*	7*d.*	15 „
Ditto, angular..		9*d.*	—	18½ „
Rolled top	6 „	8*d.*	7½*d.*	19½ „
Ditto..	7 „	9*d.*	8½*d.*	21 „
Pyramid ridge ..	7 „	1*s.* 7*d.*	—	32 „

BROSELEY ROOFING TILES.

Description.		Red, Brown. Strawberry, and Brindle,			Blue.			Weight per 1000.
		£	*s.*	*d.*	£	*s.*	*d.*	
Plain flat, 10½ in. × 6¾ in. (500 cover 100 feet)	per 1000	3	7	6	3	10	0	20 cwt.
Ornamental patterns, do.	„	3	10	0	3	12	6	20 „
Size and a half tile to break joints at gables	„	5	15	0	5	15	0	37½ „
Quoined tiles for hips (3 to a foot lineal) ..	each	0	0	4	0	0	4	4 lb. each
Do., for valleys (3 to a foot lineal)	„	0	0	4	0	0	4	4 „ „
Roofing tiles pierced for nailing, 2*s.* 9*d.* per 1000 extra.								

ADAMANTINE PAVING BRICKS.

	in. in. in.	£	*s.*	*d.*	
Clinkers for Stables and other floors .	6 × 2¼ × 1¾	2	7	6	per 1000
Ditto ditto	6 × 2¼ × 1¾ chamfered	2	10	0	„

120 pave a square yard. Weight, about 18 cwt. per 1000.

Unpressed Quarries or Flooring Tiles.

Best.	No. of Tiles to 1 Yd. Sup.	Blue, Red, per 1000.			Buff, per 1000.			Weight per 1000	
in. in. in.		£	s.	d.	£	s.	d.	tns.	cwt.
Square ..12 × 12 × 1½	9	23	5	0	25	15	0	7	10
,, 9 ,, 9 ,, 1½	16	10	12	6	12	10	0	4	0
,, 7½ ,, 7½ ,, 1⅛	23	6	5	0	7	2	6	2	3
,, 6 ,, 6 ,, 1	36	4	0	0	4	15	0	1	5
,, 4⅛ ,, 4⅛ ,, ⅞ full	75	2	10	0	2	12	6	0	11
Octagons.. 8 ,, 8 ,, 1 including small squares of either colour for intersection.	20	11	0	0	12	10	0	2	8
,, 6 ,, 6 ,, 1 do. do.	36	5	12	6	6	5	0	1	5
Oblongs.. 9 ,, 4½ ,, 1	32	4	10	0	5	12	6	1	7
Diamonds. 5 ,, 5 ,, 1	65	4	7	6	5	10	0	1	1½
Hexagons. 6 ,, 6 ,, 1	40	4	0	0	4	15	0	1	1½
Seconds.									
Squares .. 9 ,, 9 ,, 1½	16	10	0	0	—			4	0
,, 0 ,, 9 ,, 1¼	16	8	17	6	—			3	5
,, 6 ,, 6 ,, 1	36	3	12	6	4	10	0	1	5
Octagons.. 6 ,, 6 ,, 1	36	5	0	0	5	15	0	1	5
Hexagons. 6 ,, 6 ,, 1	40	3	15	0	4	10	0	1	1½

PLASTERER.

Rendering.

	Per Yard Super. Straight.	Per Yard Super. Circular.
	s. d.	s. d.
Render, one coat	0 6	0 7
„ „ and set	0 9	0 11
„ two coats, and set	0 11	1 1
„ float, and set	1 1	1 3
„ to groins	1 6	—
Lath and Plastering.		
Lathing only, single fir laths	0 8	0 10
„ and plaster, one coat	1 1	1 5
„ „ „ and set ..	1 5	1 9
„ „ „ and gauged	1 9	2 1
„ „ two coats, and set	1 8	2 0
„ „ two coats, and gauged	2 1	2 4
Lathing, plaster, float, and set	1 9	2 1
„ „ „ „ (ceilings)	1 11	—
„ „ „ „ to groins	3 6	—
If set with gauged putty .. .. add	0 2	—
If lath and half .. .. „	0 3	—
If double lath .. .. add on single fir	0 6	—
	per ft. run.	
Quirks	0 1	0 1½
Arris	0 1½	0 2
Beads	0 3½	0 6
Gauging, with plaster, for each coat of coarse stuff .. .. add	—	0 3
Stucco.		
	per yard sup.	
Bastard stucco, on brick	1 4	1 7
„ „ on lath	1 11	2 3
Trowelled stucco, on brick	1 6	1 10
„ „ on lath	2 0	2 5

STUCCO—*continued.*

	Per Foot Super. Straight. s. d.	Per Foot Super. Circular. s. d.
Trowelled stucco, on jambs and soffits	0 3½	0 4
„ „ to groins	0 4½	—
„ „ to groins, on lath ..	0 6½	—
	per ft. run.	
4½-in. reveals	0 4½	—
9-in. „	0 6½	—
Arris	0 1½	0 2
Quirks	0 1	0 1½
Bead	0 3	0 5
„ and double quirk	0 5	0 7
PUGGING. (Timbers not to be deducted.)	per yard sup.	
1½ in. thick of coarse stuff, on sound boarding	0 6	—
1½ in. thick of coarse stuff, on single fir laths	1 0	—
PLASTER FLOORS.		
Floor 2½ in. thick, floated and trowelled face	3 3	—
If on lath .. .. add extra	1 0	—
SOFFITS AND FRIEZES. (Floated and set in Putty.)	per ft. sup.	
Frieze or soffit, on brick	0 4½	0 5
„ „ on lath	0 5½	0 6½
	per ft. run.	
Raised margins, to form panels, 4 in. wide	0 4½	0 6
For every additional inch in width add	0 1	0 1½

Cornices.

	Per Foot Run.	
	Straight.	Circular.
	s. d.	s. d.
Mouldings, under 4-in. girth, per inch girth	0 1¼	—
Mouldings, from 4 to 6 in. girth, per inch girth	0 1	0 1¼
	per ft. sup.	
Mouldings, above 6 in.	1 0	1 3
All mitres above four to be counted as 1 ft. run of the moulding.		
Enrichments.	per ft. run.	
Enriched members, cast solid, per inch girth	0 2	0 3
Enriched members, undercut, per inch girth	0 3½	—
Enriched members, soffit, per inch in width	0 1¾	0 2¾

Enrichments.

	Each.	Papier Maché. Each.
	s. d.	s. d.
Cast flowers, 3 in. diameter	0 6	
" 4 in. "	0 9	
" 6 in. "	1 6	
" 9 in. "	4 6	
" 12 in. "	10 6	
" 18 in. "	16 9	
" 24 in. "	21 0	20 0
" 30 in. "	26 6	27 0
" 36 in. "	36 6	40 0
Parian Cement.	per yard sup.	
Trowelled on brick	2 0	
" lath	3 10	
	per ft. sup.	
Mouldings	1 6	
If circular, add one-fourth.		

KEEN'S CEMENT.

	Per Yard Super.
	s. d.
Trowelled on brick	2 6
„ lath	3 10
	per ft. sup.
Mouldings	1 10
If circular, add one-fourth.	

MARTIN'S CEMENT.
(For internal work can be painted on in a few hours.)

	Per Yard Sup.
	s. d.
Render on brick	1 6
Trowelled for painting	2 3
Render, float and set, on lath	3 3
Floor, 1 in. thick	4 3
	per ft. run
Narrow margins	0 4
Plain skirting, 9 in. high	0 5
„ 12 in. high	0 6½
	per ft. sup
Mouldings	1 7
If circular, add one-fourth.	

DIRECTIONS FOR USING MARTIN'S CEMENT.

This cement is to be mixed with clean water, must be well beaten up, and applied like ordinary plaster or cement.

For Walls.—Use the coarse cement in the proportion of one measure of cement to one measure and a half of clean, dry, sharp sand, for the under-coat, of half an inch thick, and finish one-eighth of an inch thick with pure cement.

For Painting.—Once within twenty-four hours after completion, care should be taken that oil alone be employed for the first coat; adding a more than ordinary quantity of dryers for the second coat; two parts of oil to one of turps for the

third coat; one part of oil to two of turps for the fourth or following coats, at the discretion of the painter; but much will depend on the description of the work; the more the suction, the more oil in proportion; body colour should be avoided in the first coat. Three coats are generally sufficient.

For Papering.—One coat of size is sufficient, and paint is not requisite.

For Floorings.—Use an equal proportion of sand and cement mixed stiff, and well beaten down with a shovel to the thickness of three-fourths of an inch on a solid foundation. Allow it to remain ten or twelve hours, and then float with half an inch of pure cement.

For Scagliola.—Work as usual.

For Castings.—Mix the materials as thick as possible to run into the moulds. Wax or sulphur moulds are best for the purpose.

For Lath Work.—Zinc nails should be used.

For Polished Work.—Proceed as for walls, but finish with fine or superfine cement if a pure white is required. It should then be worked as marble, a stopping being applied where requisite till the desired face is obtained; care should be taken that a sufficient time be allowed for the surface to dry between every application of the stone or putty powder.

To prevent stains in the work, wood or zinc trowels are recommended. When iron tools are used they should be constantly cleaned in strong lime-water; but when work is intended to be painted this precaution is unnecessary.

Plaster of Paris should not be used or mixed with this cement, nor Portland used as an under-coat.

	Per Yard Sup.
Outside Work.	*s.* *d.*
Render and rough-cast on brick	1 2
„ floated	1 6
Stucco on brick, and jointed, with blue lias lime	2 1
„ on lath and half	3 4
	per ft. sup.
Mouldings	1 6
	per ft run.
Arris	0 1¼
If circular, add one-fifth.	

MARTIN'S PATENT CEMENT, half-inch thick.

Of which	Will cover superficial	Or mixed with an equal quantity of sand.	Cost in London.	Cost in Derby.
			s. d.	s. d.
1 cwt. of 112 lbs.	28 feet	56 feet	5 0	4 3

ROMAN CEMENT.

	Per Yard Super.	
	Straight.	Circular.
	s. d.	s. d.
Rough render, 1 of cement to 1 of sand	1 5	1 10
Plain face, on brick, jointed..	1 10	2 9
„ on lath, with 1 coat of lime and hair	3 0	3 9
Plain face, on lath and half, and coat of lime and hair	3 6	4 3
Plain face, on double lath	3 11	4 8
If coloured to imitate stone .. .. add	0 4½	—
If Isle of Sheppy cement .. .. „	0 4	—
	per ft. sup.	
Plain facia, string, or pilaster	0 4½	0 5½
	per ft. run.	
Plain facia, string, or pilaster, under 9 in. wide	0 3	0 4
Arris	0 1½	0 1¾
Rustics	0 3	0 4
4½-in. reveals	0 3½	0 5
9-in. reveals	0 6½	0 8½
Astragals, grooves, and mouldings, under 3 in. girth	0 3½	0 4½
Astragals, grooves, and mouldings, 3 to 6 in. girth	0 7	0 9
	per ft. sup.	
Plain mouldings	1 2	1 4

Portland Cement.

	per yard sup. s. d.	s. d.
Plain face, on brick, jointed	2 2	2 8
	per ft. sup.	
,, facias, strings, or pilasters ..	0 5	0 6
,, moulding	1 4	1 8
	per ft. run.	
,, ,, under 3 in. girth ..	0 4½	0 5½
4½-in. reveals or margins	0 4½	0 6
9-in. ,, ,, ...	0 6½	0 8
	per ft. sup.	
Laid as paving, 2 in. thick	0 6	—

Limewhite, Whitewash, and Repair.

	Per Yard Super. s. d.
Limewhite, once	0 1¾
,, twice	0 2½
Washing and stopping	0 2
,, ,, for paperhanger	0 1½
Wash, stop, and white to new work, once ..	0 1½
,, ,, ,, ,, twice ..	0 2
,, ,, ,, old work, once ..	0 3
,, ,, ,, ,, twice ..	0 4
Wash, stop, claircolle, and white to old work ..	0 3½
Cornices.	per ft. run.
Washing and stopping plain cornices, under 12 in. girth	0 1
Washing and stopping plain cornices, 12 in. to 18 in. girth	0 1½
Washing and stopping plain cornices, for every enrichment not exceeding 3 in. girth add	0 0½
Washing and stopping plain cornices, for every enrichment not exceeding 3 in. to 6 in. girth add	0 1
Wash, stop, colour cornices, under 6 in. girth ..	0 1⅓
,, ,, ,, 6 in. to 12 in. girth	0 2
,, ,, ,, 12 in. to 18 in. ,,	0 2½
Wash, stop, colour, for every enrichment not exceeding 3 in. girth .. .. add	0 0¾
Wash, stop, 3 in. to 6 in. girth .. .. ,,	0 1½

Mastic.

	Per Yard Super.	
	Straight.	Circular.
	s. d.	s. d.
Plain face, on brick, jointed	3 3	3 9
	per ft. sup.	
„ mouldings	1 10	2 4
	per ft. run.	
Arris	0 1¾	0 2¾
Margins and reveals, for every inch in width	0 1¼	0 1¾

Colouring.

		Per Yard Super.
		s. d.
Wash, stop, and colour (stone, buff, or salmon), once		0 4½
Wash, stop, and colour (stone, buff, or salmon), twice		0 5½
Wash, stop, and colour (lemon or straw),	once	0 5
„ „ „ „ „	twice	0 6½
„ „ „ (grey or straw)	once	0 6
„ „ „ (grey)	twice	0 8½
„ „ „ (blue)	once	0 8
„ „ „ „	twice	0 11½
„ „ „ (green, verditer)	once	0 8½
„ „ „ „ „	twice	1 2½

Day Work and Materials.

		s.	d.
Plasterer	per hour	0	10
Labourer	„	0	6½
Boy	„	0	3
Modeller	„	1	0
Lime and hair	.. per hod	0	9½
„ „ for outside work	„	0	10
Fine stuff	„	1	3
Putty	„	1	7
Stucco	„	1	6
Plaster, coarse	.. per bag	0	9
„ fine	„	0	10
„ superfine	„	1	1
„ French	„	0	6½
Chalk lime	per bushel	0	9
Dorking lime	„	0	10
Thames sand, washed	„	0	4½
Gypsum	„	1	10
Cement, Roman	„	2	0
„ Portland	„	2	6
„ metallic	„	1	6
Cement, Atkinson's	per bushel	4	2
„ Keen's	„	4	8
„ „ fine	„	7	0
„ Parian	„	4	9
„ „ fine	„	7	6
„ Martin's	„	4	4
„ „ fine	„	5	6
„ „ superfine	„	8	0
Hair	„	1	5
Mastic	.. per cwt.	5	3
Linseed oil	per gallon	3	8
„ (boiled)	„	4	10
Double size	„	1	0
Single „	„	0	9
Laths, single fir ..	per bundle (500 ft. run)	2	2
„ „ and nails	per bundle	2	8
Lath and half	„	3	2
„ „ and nails	„	3	9
Double lath	„	4	3
„ and nails	„	5	0

Day Work and Materials—*continued.*

		s.	d.
Whiting	per dozen	0	4½
„ best	„	0	6½
Limewhite	per pail	0	7
Whitewash, with size	„	1	0
Colour, common	„	1	6
„ lemon and straw	„	2	6
„ blue	„	3	0
„ green (verditer)	„	4	0
Wax moulds	per lb.	3	6

Prime Cost Prices of Materials.

		s.	d.
Cement.—Prices at London.			
Romam cement	per barrel	11	6
Portland „	„	12	6
„ „ White's make ..	„	11	6
Lime.—Free on trucks at Works.			
Lump Lias	per ton	12	6
Common plaster	„	50	0
Fine „	„	55	0
Plaster of Paris.			
Liverpool	per ton	36	0
Loughborough..	„	27	0
Burton	„	27	0

Patent Selenitic Lime,

When mixed with four or five parts of clean sharp sand, forms an excellent ground for Parian, Keen's, or Martin's cement. Six parts of sand to one of selenitic lime can be used for plastering on brick; and four parts of sand, one part of selenitic lime, and one part of well-haired lime putty, well mixed together, for lathwork.

Plasterers' work in selenitic can be completed in one-third the time required by the ordinary method, and is very superior in quality. It is also very largely used in conjunction with Portland cement for concrete building, and is equally suitable as a ground for asphalte paving.

Selenitic lime averages in price from 25*s.* at Works to 30*s.* per ton in London; in the country its price varies with the price of the local lime.

PLASTERING, PER YARD.

	Straight.			Circular.		
	£	*s.*	*d.*	£	*s.*	*d.*
Render and float on brick, and set in ordinary setting stuff..	0	1	1	0	1	4
Ditto, and finish in selenitic stucco	0	1	5	0	1	9
Lathwork. (Single fir laths.)						
Lath, render, float, and set in ordinary setting stuff	0	1	7	0	1	11
Ditto, and finish in selenitic stucco	0	1	11	0	2	2
Per ton of 36 bushels, at wharf, 30*s.*						

Concrete, if mixed with two-thirds of selenitic lime and one-third Portland, and the usual proportion of ballast, &c., will cost per rod 5*l.*

N.B. Selenitic lime is not to be used for cornices; or any work gauged with plaster.

SELENITIC CEMENT CO.,
Lambeth, S.E.

PLUMBER.

PRIME COST PRICES OF MATERIALS.

		£	*s.*	*d.*		£	*s.*	*d.*
LEAD.								
Pig, English	per ton	20	0	0	to	20	5	0
„ Foreign	„	19	5	0	„	19	10	0
Sheet, Milled	„	20	10	0	„		—	
White, dry	„	26	0	0	„		—	
COPPER.								
Australian		73	0	0	„	74	0	0
Bottoms		77	0	0	„	78	0	0
Sheet		74	0	0	„	75	0	0

	£	s.	d.
Milled lead in the sheet .. .. .. per cwt.	1	7	0
„ cut to sizes .. .. „	1	9	0
„ in gutters, flats, hips, or ridges „	1	12	0
„ in flashings .. .. „	1	13	0
Allowance made for old lead .. .. „	0	16	0
Block tin .. .. per lb.	0	1	6
Solder .. .. „	0	1	0

DRAWN LEAD PIPE (including Fixing).

	Per Foot Run.		
	Common.	Middling.	Strong.
	s. d.	s. d.	s. d.
½ in.	0 5	0 6	0 7
¾ „	0 8	0 9	0 10½
1 „	0 11	1 2	1 5
1¼ „	1 1	1 4	1 9
1½ „	1 5½	1 10	2 1
2 „	2 2	2 7	3 0
2½ „	2 9	3 3	3 10

UNION JOINTS (including Solder and Labour).

	s. d.		s. d.
½ in. .. each	1 6	2½ in. .. each	4 3
¾ „ .. „	2 0	4 „ .. „	4 0
1 „ .. „	2 6	4½ „ .. „	4 6
1½ „ .. „	3 3	5 „ .. „	5 0
2 „ .. „	3 9	6 „ .. „	6 0

SOLDERED PIPES.

	Per Foot Run.		Per Foot Run.
	s. d.		s. d.
1 in.	1 4	1½ in.	1 11
1¼ „	1 6	2 „	2 4

Rain-water, and Socket, and Funnel Pipes.

	Per Foot Run. 6 lb.		Per Foot Run. 7 lb.			Per Foot Run. 6 lb.		Per Foot Run. 7 lb.	
	s.	d.	s.	d.		s.	d.	s.	d.
2 in... ..	1	7	1	10	4 in... ..	2	9	3	1
2½ „	1	10	2	1	4½ „	2	11	3	7
3 „	2	2	2	4	5 „	3	4	4	0
3½ „	2	5	2	8	6 „	4	4	5	0

Lead.

		s.	d.
Square cistern heads	each	10	6
Moulded „	„	18	0
Hoppers	„	12	0
Traps..	„	18	0
Service box traps	„	10	0
Safes for traps and closets	„	8	0
4 in. cast lead D traps	„	9	6
„ „ with inspection plug	„	30	0
„ soil traps	„	8	6
„ „ bend	„	6	6
3 in. lead traps	„	5	6
2 „	„	4	6

Traps.

	2½ in.		3 in.		3½ in.		4 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Lead traps, with brass bell grates .. .. each	1	9	2	0	2	6	3	0
Brass grates .. .. .. „	0	8	0	10	1	0	1	
Brass bell trap and grate „	1	6	1	9	2	0	2	

Driving Ferrules.—(Exclusive of fixing.

	Each. s.	Each. d.		Each. s.	Each. d.
½ in.	0	9	1 in.	2	4
¾ „	1	1	1¼ „	3	11

Pumps.

	Each, prime cost.								
	2½ in.		3 in.			3½ in.		4 in.	
	£	s.	£	s.	d.	£	s.	£	s.
Common lead pumps ..	1	10	2	0	0	2	15	3	5
Brass well „ ..	3	10	4	7	6	5	15	6	5
Hydraulic „ ..	5	12	6	16	0	8	10	9	5
Iron lift „ ..	1	16	2	5	0	2	10	3	15
Strong brass force ditto, on plank	5	5	6	7	6	7	15	8	15
Iron cottage pumps ..	1	0	1	6	0	1	12	—	

Deep well pump, with fly wheel, &c. .. .. £10 to £16.
„ Cast iron, with horse wheel, &c... £40.

Valves.

Long Spindle or Shoe Valves. Short Spindle Valves.
Air pipe, 9*d.* extra.

	s.	d.		s.	d.
1½ in. .. each	5	0	¾ in. .. each	1	8
2 „ .. „	7	6	1 „ .. „	2	0
3 „ .. „	16	0	1¼ „ .. „	2	9
			1½ „ .. „	3	6
			2 „ .. „	5	6
			3 „ .. „	12	6

Sundry Articles.

(Joints extra.)	½ in.		¾ in.		1 in.		1½ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Brass washers and wastes or plugs each	1	4	1	6	2	2	3	6	5	0	10	0
Boiler screws .. „	1	4	1	9	2	8	5	0	8	0	—	

	Ball. in.	Each. s.	d.
Copper water balls and rods for ½-in. cock	4½	2	3
„ „ „ „ ¾-in. „	5	2	6
„ „ „ „ 1-in. „	6	4	3
„ „ „ „ 1½-in. „	8	9	0
„ „ „ „ 2-in. „	10	16	0

Cocks.

		½ in.		⅝ in.		1 in.		1¼ in.		1½ in.	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Bib and ball cock, screw ferrules and bottom	each	3	0	4	6	8	0	11	0	15	0
Stop cocks, square way	,,	2	6	3	9	7	0	10	0	13	0
,, screw ferrules	,,	3	0	4	9	8	3	—		—	
,, round way	,,	3	6	5	0	10	6	—		—	
,, screw bottom	,,	4	0	5	6	11	2	—		—	
Bosses extra	,,	0	8	0	10	1	6	—		—	

Valves—At Warehouse.

(Joints extra.)	⅜″		½″		¾″		1″		1¼″		1½″		2″		2½″	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
High-pressure screw down valves, plain shanks, each	2	1	2	10	4	6	6	10	12	9	18	6	45	0	—	
,, ,, with one union ,,	3	2	4	1	6	5	9	4	17	9	24	6	53	0	—	
,, ,, ,, two ,, ,,	4	3	5	4	8	4	11	10	21	9	30	6	61	0	—	
Bib valve .. .. ,,	2	1	2	10	4	6	6	10	12	9	21	0	46	0	—	
,, with boss .. .. ,,	2	8	3	6	5	6	8	9	16	9	24	6	52	6	—	
,, for iron pipe, with union .. .. ,,	—		4	8	7	2	10	6	20	0	30	0	—		—	
Screw bosses extra .. .. ,,	—		0	8	0	11	1	8	2	3	3	3	—		—	
Diaphragm, screw down valves .. .. ,,	3	8	3	9	5	3	8	6	18	6	25	0	—		—	
Gun-metal bath cock, with two unions .. .. ,,	—		—		11	6	19	6	28	6	39	6	—		—	

PLUMBER'S FITTINGS.

(Joints extra.)	3/8″	1/2″	3/4″	1″	1¼″	1½″	2″	2½″
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Washer and plug	—	1 2	1 4	1 10	2 6	3 1	4 5	—
„ with unions	—	2 8	3 4	4 6	6 2	—	—	—
„ „ grate and fly nut	—	—	3 4	5 0	6 6	8 6	13 6	—
Washer and waste for slate and iron cisterns ..	—	—	2 9	4 2	5 1	6 10	11 6	16 6
Butler's pantry, washer and plug with brass grate	—	—	—	2 0	2 3	3 0	4 6	6 6
Ferrule for main	—	0 10	1 0	1 10	2 9	—	—	—
„ with union	—	1 9	2 8	3 8	5 0	—	—	—
Bent ferrule, with back nut	—	1 3	1 9	3 10	5 10	8 10	—	—
Driving ferrule	—	0 9	1 1	2 4	3 11	4 6	—	—
Union joint for lead pipe	1 0	1 4	2 2	2 8	4 3	5 0	7 10	—
Barrel union for iron pipe	1 4	1 6	2 2	2 9	4 0	5 0	8 6	23 0
Screw-cap and screw	—	—	—	1 1	1 3	1 8	2 4	3 3
Equilibrium ball valves, turned ends	3 0	3 5	4 8	8 0	13 0	23 0	42 0	—
„ „ screw ends	3 3	3 9	5 2	8 9	14 6	25 3	45 0	—
„ „ for high pressure, screw ends	—	5 3	7 0	11 3	18 0	25 3	50 0	—
„ „ „ tinned ends	—	4 11	6 6	10 6	16 6	23 0	47 0	
Copper balls, extra	0 11	1 3	1 10	2 6	5 6	9 0	17 6	—
Zinc ditto „	0 6	0 9	1 1	1 8	2 6	4 9	8 6	—
Rods only	0 6	0 7	0 11	1 4	1 8	2 8	8 0	—

UNDERHAY'S EQUILIBRIUM BALL VALVES,
For High Pressure and Constant Supply.

Prices with Copper Balls.

	3/8	1/2	5/8	3/4	7/8
Round shank..	4s. 3d.	4s. 9d.	5s. 3d.	6s. 2d.	8s. 3d.
Screw ferrule .	4s. 10d.	5s. 5d.	6s. 3d.	7s. 2d.	9s. 5d.

	1	1¼	1½	2
Round shank..	10s. 0d.	15s.	21s.	43s.
Screw ferrule..	11s. 8d.	17s.	24s.	48s.

3/8 supply, screw ferrule, with ½ copper ball .. 4s. 6d.

Improved extra strong Round-way, Screw-down, Bib, and Stop Cocks.

These cocks cannot leak between the spindles and caps, and are specially adapted for high service and constant pressure.

	3/8		1/2		5/8		3/4		1	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Bib, round shank ..	2	10	3	1	4	0	4	6	7	9
„ screw ferrule ..	3	6	3	8	4	11	5	4	9	5
„ screwed for iron	3	2	3	4	4	5	4	11	8	7
If rough barrels, less	..		0	2	0	3	0	4	0	5
With stuffing boxes extra	1	6	1	8	2	0	2	0	2	0
Stop	2	10	3	0	4	0	4	6	7	9
„ screwed one end	..		3	10	4	5	4	11	8	7
„ „ both ends	..		4	2	4	11	5	4	9	9
If rough barrels, less	..		0	2	0	3	0	4	0	5
With stuffing boxes extra	1	6	1	8	2	0	2	0	2	0

MOULE'S DRY EARTH CLOSET APPARATUS.

	Each. £	s.	d.
No. 1, for cottages, pull out, complete	1	6	0
„ 2, „ pull up, „	1	16	0
„ 3, „ self-acting, „	2	5	0
„ 5, „ self-acting, with white earthenware rim and deal seat	2	10	0

Woodwork and fittings extra.

WATER-CLOSETS.

	Each. £ s. d.
Pan closet, with valve	1 16 0
„ „ ivory handle and white basin	2 7 6
„ „ patent valve and apparatus ..	£4 to £6
Hopper basin	0 9 0
Wash-hand basin, with brass washer and chain	0 6 0
„ blue, „ „	0 8 0
Water-waste preventers	£2to£2/10
Automatic disinfectors for water-closets, exclusive of fixing	1 1 0

PLUMBERS' FITTINGS—exclusive of fixing.

WATER-CLOSETS.	£ s. d.
Tylor's brass regulator seat action water-closet, with 1 in. valve with unions .. .. each	2 15 6
Earthenware basin and trap	0 9 9
Enamelled iron hopper and cast-iron traps ..	0 19 0
Tylor's brass regulator pan closet, white basin, noiseless..	2 19 0
Tylor's best quality patent noiseless brass regulator valve closet, brass flat plate and handle, white basin	4 18 6
Ditto, with large round lacquered brass sunk dish and cut-glass amber handle, and white basin	4 18 6
Ditto, ditto, with large round lacquered brass sunk dish and cut-glass amber handle, and handsome pattern basin	5 8 0
Ditto, blue Gothic-pattern basin .. .. extra	0 5 0
Ditto, handsome flowers and gilt basin .. „	0 12 0
Electro-plated dish, fan, and bottom plate extra	0 12 0
Lead D trap, 16s.; outlet pipe, extra 4s.; 4 in. cleaning screw, extra 8s.	
Extra for 1-in. valve, which is recommended when the cistern is less than 6 feet above the closet	0 4 0
No woodwork, pipe, or cistern included in above prices.	

PLUMBERS' FITTINGS—*continued.*

PATENT BRASS REGULATOR VALVE CLOSETS. (Underhay's.)	Price at Warehouse. £	s.	d.
Best quality Valve Closet, ¾ valve, white basin, patent brass air regulator, flat plate, and brass drop handle	4	12	6
Ditto, ditto, with sunk dish and cut glass handle	4	11	6
Ditto, ditto, with fancy basin, sunk dish, and cut glass handle	5	3	0
Ditto, with plated dish, ivory handle, glass bottom-valve, and white basin	5	15	0
Ditto, ditto, and fancy basin	6	0	0
Ditto, ditto, white and gold line basin	6	5	0
If with plated German-silver fan .. extra	0	5	0
Second quality Valve Closet, ¾ valve, white basin, patent brass air regulator, flat plate, and brass drop handle	3	17	0
Ditto, ditto, and fancy basin..	4	2	0
Ditto, ditto, with white basin, sunk dish, and cut glass handle	4	2	0
Ditto, ditto, with fancy basin	4	7	0
Silvered glass valves .. .. extra	0	8	0
Any of the above closets with 1 in. valves "	0	3	0
With the new patent water-waste preventer attached, for ¾ valves .. .. "	1	2	0
Ditto, ditto, for 1 in. valves .. .. "	1	5	0
Underhay's best strong Pan Closet, with flat plate and brass drop handle, white basin, ¾ valve, and patent brass air regulator	2	14	0
Best strong pan closet, with large sunk brass dish, cut glass handle, white basin, and patent brass air regulator	3	0	0
Ditto, ditto, and blue basin	3	3	0
Second quality Pan Closet, ¾ valve, flat plate and brass drop handle, white basin, and patent brass air regulator	2	15	0
Ditto, ditto, with brass sunk dish, opal handle, white basin, and patent brass air regulator ..	2	15	6
Ditto, ditto, with blue basin..	2	19	0

Plumbers' Fittings—*continued.*

Patent Brass Regulator Valve Closets—*cont.*	£	s.	d.
Third quality Pan Closet, with flat plate, brass drop handle, ¾ valve, white basin, and patent brass air regulator	2	8	0
Ditto, ditto, with sunk dish, opal handle, and white basin	2	13	0
Any of the above closets with 1 in. valves, extra	0	3	0
With white earthenware containers .. „	0	13	6
With the new patent water-waste preventer attached, for ¾ valves .. .. „	1	2	0
Ditto, ditto, for 1 in. valves .. .. .. „	1	5	0
Lavatory Fittings.			
Lavatory valves, viz. hot, cold, and waste, with pull-up knobs, plates, and chains, and brass connection for basin .. .. per set	2	15	6
Ditto, ditto, cold and waste, with ditto „	2	1	0
Electro-plated fittings .. .. extra	0	8	0
Earthenware plates, gilt letters, per valve „	0	2	0
Larger hot and cold valves, for very small pressure.. .. .. „	0	5	0
Lavatory basin, white, gold lines, overflow, 17 in. outside diameter	1	7	6
Ditto, 19 in. ditto	1	16	6
Ditto, flown blue pattern, 17 in. outside diameter	1	1	0
Ditto, 19 in. ditto	1	7	6
Ditto, plain white, 17 in. outside diameter.. ..	0	16	6
Ditto, 19 in. ditto	1	1	0
Lavatory valves, consisting of cold and waste valve, with pull-up knobs, plates and chains, and brass connection for basin.. .. per set	1	15	6
Larger cold valve, for very small pressure, extra	0	2	6
Electro-plated fittings .. .. „	0	6	6
Earthenware plates with gilt letters .. „	0	4	0
Marbled earthenware angular table top, length of side, 20½ in.	1	15	6
No woodwork or pipe included in above prices.			
Urinals.			
Self-acting galvanized treadle urinal platform, with valve complete	2	2	0
Improved flat back earthenware flushing urinal, small size	0	14	6
Ditto .. .. large „	1	1	0

PLUMBERS' FITTINGS—*continued.*

URINALS—*continued.*		£	s.	d.
Enamelled angle urinal, with grated iron pipe for waste, requiring no brass work .. each		0	7	3
Earthenware improved flushing, with inlet arm and waste pipe		0 15 0 to 1 1 0		
High-pressure Diaphragm Bib Valves:—				
With screw ferrule for lead pipe. Screw cut to fit iron pipe	⅜ in. ..	0	3	0
Ditto ditto	½ in. ..	0	3	6
Ditto ditto	⅝ in. ..	0	4	7
Ditto ditto	¾ in. ..	0	5	2
Ditto ditto	1 in. ..	0	8	2
Ditto ditto	1¼ in. ..	0	16	0
Ditto ditto	1½ in. ..	1	4	0
With shanks tinned for lead pipe	⅜ in. ..	0	2	6
Ditto ditto	½ in. ..	0	3	0
Ditto ditto	⅝ in. ..	0	3	10
Ditto ditto	¾ in. ..	0	4	5
Ditto ditto	1 in. ..	0	6	8
Ditto ditto	1¼ in. ..	0	14	6
Ditto ditto	1½ in. ..	1	1	0
BATHS.				
Tylor's Patent Lock-waste Bath Apparatus, with two 1-in. loose valve screw-down supply taps, with gilt-lettered porcelain knobs, "Cold" and "Hot," brass spout and mountings, with quick-waste bath valve with unions for 1¼-in. lead pipe on inlet and outlet, with gilt-lettered porcelain knob, brass pull-up, and 19 inches of lead pipe attached, and piece of strong copper wire		5	0	0
Electro-plated mountings .. .. .. extra		1	0	0
Taper Oval-end Bath, with one reversible copper pipe for waste and overflow or warning pipe, with flange connections—				
5 ft. 3 in. copper		10	5	0
5 ft. 6 in. "		10	15	0
5 ft. 3 in. galvanized tinned iron		5	10	0
5 ft. 6 in. "		5	15	6
5 ft. 3 in. zinc		3	3	0
5 ft. 6 in. "		3	10	0

Plumbers' Fittings—*continued.*

Baths—*continued.*	£	s.	d.
The above baths finished sea green instead of white marble .. .. extra	0	12	0
Wood cradle fitted to bath on all sides, preventing damage in carriage, and forming its permanent support	0	16	9
Tall-way diaphragm bath valves, with wrought-iron rods, letters, and plates, hot, cold, and waste	3	12	0
Shower bath, rounded copper, white marbled outside, complete..	3	17	6
½ in. patent bell valve and ball	0	4	8
Galvanized tinned iron shower bath	2	17	6

Time and Materials.

		s.	d.
Plumber	per hour	0	10½
Labourer	"	0	6½
Lead	per cwt.	30	0
Solder	per lb.	1	0
Tin	"	1	6
Wall hooks	each	0	2
Lead-headed nails	"	0	1½
" large	"	0	2
Clout nails	per hundred	0	3½

Power required to Raise Water from Deep Wells.

Quantity of Water raised per hour.	Maximum depth from which the quantity can be raised by each unit of power.			
	One Man turning a Crank.	One Donkey working a Gin.	One Horse working a Gin.	One Horse-Power Steam Engine.
225 gallons	80 ft.	160 ft.	560 ft.	880 ft.
360 "	50 "	100 "	350 "	550 "
520 "	35 "	70 "	245 "	385 "
700 "	25 "	50 "	175 "	275 "
900 "	20 "	40 "	140 "	220 "

SMITH AND FOUNDER.

Rolled Iron Girders. (P. C. Exclusive of Fixing.)

	Per ton, prime cost. £ s. d.
16 in. × 5½ in. × 5½ in., about 57 lbs. per ft.	10 15 0
14 ,, × 5½ ,, × 5½ ,, ,, 60 ,,	
12 ,, × 6 ,, × 6 ,, ,, 56 ,,	9 10 0
12 ,, × 5 ,, × 5 ,, ,, 42 ,,	8 15 0
10 ,, × 4¾ ,, × 4¾ ,, ,, 32 ,,	
9½ ,, × 3¾ ,, × 3¾ ,, ,, 24 ,,	
8 ,, × 5 ,, × 5 ,, ,, 29 ,,	8 10 0
8 ,, × 4 ,, × 4 ,, ,, 24 ,,	
6 ,, × 5 ,, × 5 ,, ,, 27 ,,	
5 ,, × 4½ ,, × 4½ ,, ,, 23 ,,	
3 ,, × 3 ,, × 3 ,, ,, 9 ,,	9 0 0
7 ,, × 3⅝ ,, × 3⅝ ,, ,, 19 ,,	8 5 0
6¼ ,, × 3¼ ,, × 3¼ ,, ,, 16 ,,	8 5 0
5 ,, × 3 ,, × 3 ,, ,, 13 ,,	
8 ,, × 2½ ,, × 2½ ,, ,, 15 ,,	8 5 0
7 ,, × 2¼ ,, × 2¼ ,, ,, 14 ,,	8 15 0
6¼ ,, × 2¼ ,, × 2¼ ,, ,, 11 ,,	
4¾ ,, × 2 ,, × 2 ,, ,, 8 ,,	8 0 0
4 ,, × 2 ,, × 2 ,, ,, 7 ,,	
3 ,, × 2 ,, × 2 ,, ,, 5½ ,,	
Lengths to 20 ft. without extra; 7*s*. 6*d*. per ton extra for each 5 ft. over 20 feet.	
Flitch plates to 5 cwt. each, without extras; 5*s*. per ton extra for each ½ cwt. over 5 cwt.; drilling bolt holes, 6*d*. each.	9 0 0
Bolts, nuts, and washers for ditto:—	per cwt.
¾ in. diam. × 6 in. and longer	1 3 0
⅝ ,, ,, ...	1 4 6
½ ,, ,, ...	1 6 0
Bond hoop iron, 1½ in. × 16 in., 1¼ in. × 17 in., and 1 in. × 18 W. G...	per ton. 9 0 0
⅞ in. × 19 in. ,, ...	9 10 0
¾ in. × 20 in. ,, ...	10 0 0
Bridge and contractors' rails, 18 and 28 lbs. per yd.	9 0 0
Barrow plates, 6 in. × ¼ in.	9 0 0
,, 7 ,, × ¼ ,, ...	
,, 8 ,, × ¼ ,, ...	

Bolt-ends with square nuts ½ in. diameter, 19*s.* 6*d.*, ¾ in. and larger, 17*s.* 6*d.* per cwt. Hexagon nuts, 2*s.* 6*d.* per cwt. extra.

Compound riveted girders, from £11 10*s.* per ton. Ordinary riveted girders, from £12 10*s.*

Cast Iron. (Exclusive of Patterns and Fixing.)

	Per Cwt.				
	s.	*d.*		*s.*	*d.*
Girders, standards, and plain castings..	12	6	to	14	0
Hollow columns	13	0	„	15	0
Area gratings, plain	12	0	„	16	0
Small doors and frames...	15	0	„	20	0
Sashes and frames	16	0	„	20	0

	Each.	
	s.	*d.*
4-in. bell trap	1	0
6-in. „	1	9
9-in. „	3	6
Air bricks, 9 in. × 4½ in.	0	7
„ 14 „ × 4½ „	1	4

Cast-iron Pipes and Gutters. (Exclusive of Fixing.)

	Per Yard Run.											
	2½ in.		3 in.		3½ in.		4½ in.		5 in.		6 in.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Pipes (round)	1	0	1	3	1	6	2	0	2	6	3	6
Gutter H.R.	—		0	7	0	8	0	11	1	1	1	4
Add for fixing	0	7	—		0	9	0	11	1	1	1	2
					each.							
Elbows, Plinth Bends ..	1	2	1	5	1	8	2	4	2	9	3	6
Shoes	1	0	1	2	1	4	1	10	2	6	3	0
Heads	1	10	2	0	2	4	3	0	3	6	4	3
O G Gutters	—		—		1	0	1	4	1	6	1	10

Brackets, 6*d.* each. Nails for pipes, 8*d.* per dozen.
Bolts and Nuts, 5*s.* 4*d.* per gross.

SQUARE RAIN-WATER PIPES. (Exclusive of Fixing.)

	Per Yard Run.			
	2½ in. × 2 in.	3 in. × 2 in.	4 in. × 2½ in.	5 in. × 3 in.
	s. d.	s. d.	s. d.	s. d.
Pipes ..	2 6	2 10	3 3	4 6
Elbows ..	2 9	3 6	4 0	5 6
Shoes ..	1 9	2 0	2 10	4 0

MISCELLANEOUS.

WROUGHT IRON. (Exclusive of Fixing.)

		s. d.
Straps and ties in floors and roofs ..	per lb.	0 4
Chimney and bearing bars	"	0 3½
Screw bolts with nuts and washers ..	"	0 6½
Plain balusters	"	0 5
Casements and saddle bars	"	0 7
Open iron cisterns, small sizes	per gall.	0 9
" " galvanized	"	0 11
" " large sizes	"	0 4
" " " galvanized	"	0 5
Copper-hole door and frame, 12 in. diam. ..	each	3 0 to 6 0
" " 18 in.	"	12 0
Iron pavement lights, with rough plate glass .. .. With glass, 4s. extra.	per ft. super.	8 6

GALVANIZED IRON.

	Per Ton.
	£ s. d.
No. 12 gauge, weighing 4½ lbs. per sq. ft...	26 0 0
" 16 " " 3½ " " ..	27 10 0
" 20 " " 2¼ " " ..	29 0 0
If corrugated, add	1 10 0
If curved "	0 10 0

Cisterns and Miscellaneous, P. C. (Exclusive of Fixing.)

	Open top.			Closed.	
	£	s.	d.	s.	d.
Wrought-iron cistern, 600 gallons, each	7	10	0	—	
Ditto, 400 gallons	4	10	0	—	
Ditto, 5 by 2·3 by 3, 200 gallons ..	3	12	6	—	
Ditto, 4 by 2 by 2, 100 gallons ..	2	5	0	—	
Ditto, galvanized, 150 gallons, per gall.	0	0	5	0	9
Ditto, 75 gallons .. .. .. ,,	0	0	6	0	11
Ditto, 50 ,, ... ,,	0	0	7	1	0
Ditto, 30 ,, ... ,,	0	0	10		
Ditto, with divisions .. .. .. ,,	6*d.* and upwards				
Wrought-iron manger, with drinking portion complete, for two horses per foot	0	6	0		

Corrugated Iron.

	£	s.	d.
No. 20 gauge galvanized corrugated iron, in sheets, 6, 7, or 8 ft. long, 2 ft. wide per ton	22	0	0
No. 24 gauge ditto.. .. .. .. ,,	24	0	0
Fancy perforated zinc .. .. .. per ft.	0	0	4½
Safe hole ditto.. .. .. ,,	0	0	3

Patent Wrought-Iron Water-tight Casements and Frames.

			s.	d.
Under 2 ft. in height	.. ..	each	30	0
2 ft. and under 3 ft. in height	.. .. ..	,,	32	0
3 ft. ,,	3 ft. 6 in.	,,	36	0
3 ft. 6 in. ,,	4 ft. in height	,,	44	0
4 ft. ,,	4 ft. 6 in. ,, ...	,,	48	6
4 ft. 6 in. ,,	5 ft. 6 in. ,, ...	,,	55	0

Extras.—If with more than one cros -bar, or with squares if the gun-metal fittings are lacquered or bronzed, if with shaped heads.

Wrought-iron "Fixed Lights" to correspond in appearance with the above casements, with or without one cross-bar to each, and with square heads.

		s.	d.
Under 2 ft. in height	each	14	0
2 ft. and under 3 ft. in height	„	15	6
3 ft. „ 3 ft. 6 in. „	„	17	6
3 ft. 6 in. „ 4 ft. „	„	20	0
4 ft. „ 4 ft. 6 in. „	„	22	6
4 ft. 6 in „ 5 ft. 6 in. „	„	25	0

Windows and frames as above, hung at top to open outwards, and fitted with plainly filed gun-metal jointed stays and fastenings, with or without one cross-bar to each, and with square heads, any size up to say 3 ft. 6 in. in height, 40*s*. each.

Windows and frames, hung at bottom to open inwards, and fitted with gun-metal quadrants, with or without one cross-bar to each, and with square heads, any size up to say 3 ft. 6 in. in height, 30*s*. 6*d*.

WROUGHT-IRON CASEMENTS AND FRAMES,

Of their new section, with iron lever handles and iron stays, with or without one cross-bar to each, and with square heads.

N.B.—These casements are not guaranteed to be water-tight, but are sufficiently so for schools, cottages, &c.

		s.	d.
Under 2 ft. in height	each	20	0
2 ft. and under 3 ft. in height	„	21	0
3 ft. and under 3 ft. 6 in. in height	„	23	0
3 ft. 6 in. and including 4 ft..	„	25	6

WINDOWS AND FRAMES

Hung on centres any size up to say 3 ft. 6 in. in height, 22*s*. and 28*s*. 6*d*. each.

WROUGHT-IRON HOPPERS FOR CHURCHES AND SCHOOLS,

To fall inwards, and with sides for glazing, and with two pulleys, 27*s*. each.

Wrought hoppers, as above, with top to lift up, and fitted with hinges, 21*s*. each.

N.B.—With all the above, the prices are determined solely by the heights irrespective of the widths, which may vary from, say 6 in. to 2 ft.

WELDED WROUGHT-IRON TUBES FOR GAS, STEAM, AND WATER. (Exclusive of Fixing.)

	Inside Diameter in Inches.										
	⅛	¼	½	¾	1	1¼	1½	2	2½	3	4
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Tubes, from 2 to 14 ft. .. ..per ft.	0 2½	0 3	0 4½	0 6	0 8	0 11	1 2	1 9	3 3	4 6	7 0
Ditto, 12 to 23½ in. .. .. .. each	0 4	0 5	0 9	1 0	1 4	1 8	2 0	3 0	6 3	9 0	14 6
Connecting tube, 12 to 23½ in. .. ,,	0 5	0 7	0 11	1 2	1 6	2 0	2 6	4 0	7 0	10 0	15 6
Tubular bends and lamp bends } Springs, various elevations } ,,	0 5½	0 6½	0 8	0 11	1 3	1 9	2 3	4 3	10 0	16 0	32 6
Socket or pipe unions, wrt. iron ,,	..	2 0	3 0	4 0	5 6	6 9	8 0	10 0	14 0	18 0	28 0
Elbows, equal or diminished } Tees ,, ,, } ,,	0 6	0 6½	0 9	1 0	1 3	1 9	2 6	3 9	9 6	16 6	30 0
Crosses ,, ,, .. ,,	0 10	1 0	1 5	1 9	2 3	3 0	3 6	5 3	16 0	30 0	50 0
Sockets, plain .. .. ,,	0 1½	0 1½	0 3	0 3½	0 4	0 6	0 7	1 0	2 6	3 6	6 0
Ditto, diminished .. .. .. ,,	..	0 3	0 5	0 6	0 7	0 9	0 11	1 3	3 0	5 0	9 0
Flanges .. .. ,,	0 8	0 9	1 0	1 2	1 4	1 6	1 9	2 6	5 0	8 6	11 6
Caps and plugs .. .. ,,	0 2	0 3	0 4	0 5	0 6	0 8	0 10	1 3	2 6	4 9	10 0
Backnuts and nipples .. .. ,,	0 1	0 2	0 3	0 3½	0 4	0 6	0 8	1 0	2 3	3 6	5 6
Union bends or elbows .. .. ,,	..	2 6	3 9	5 0	6 3	8 6	10 0	13 6	19 0	25 0	36 0
Elbows, round backed, wrt. iron ,,	0 7	0 7	0 9	1 0	1 4	1 11	2 6	3 10	10 0	16 0	32 0
Iron main cocks .. .. ,,	2 3	2 3	3 6	4 6	6 6	8 6	11 0	18 0	36 0	50 0	90 0
Ditto, brass plugs .. .. .. ,,	..	..	5 6	7 6	10 6	15 0	19 6	32 0	60 0	110 0	190 0
Ditto, round way .. .. .. ,,	..	..	4 4	5 6	7 6	10 0	13 0	22 0	54 0	70 0	160 0
Ditto, ditto brass plugs .. .. ,,	..	..	6 6	9 0	13 0	19 0	28 0	42 0	85 0	120 0	280 0
Spanners, for cocks, wrt. iron .. ,,	..	..	1 4	1 8	2 0	2 4	3 0	4 0	6 0	9 0	14 0
Ditto, ditto, malleable cast iron ,,	..	..	0 8	0 10	1 2	1 8	2 2	3 3	6 0	9 0	14 0

Galvanized Wrought-iron Pipe and Fittings.

At the warehouse.

	Per Foot Run.						
	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.	¼ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Tube in lengths from 2 ft. to 14 ft.	2 3	1 6½	1 2½	0 11	0 8	0 6	0 4
Short pieces under 2 ft. ..	3 9	2 6	2 2	1 8½	1 3½	1 0	0 6½

(Exclusive of Fixing.)

	Per Foot Run.				
	3 in.	2½ in.	2 in.	1½ in.	1¼ in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Strong tinned and brazed copper pipe	5 6	3 10	2 11	2 0	1 10

Cast-Iron Flange Pipe.

	1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Per yard at Warehouse	2 6	3 5	4 4	4 8	7 3	9 9	12 0
Over 6 in. 15s. per cwt.							
Bends, T's, Branches, &c., per cwt.	22 0	19 0	19 0	18 6	18 0	17 6	17 6
Cast-Iron Socket Pipe.							
Per yard at Warehouse	1 8	2 3	3 0	3 5	5 3	7 0	9 0
Over 6 in. 11s. per cwt.							
Sockets, T's, Bends, &c., per cwt. ..	20 0	17 6	17 6	17 0	17 0	16 6	16 6

Circular Iron Staircases—Complete.

		£	s.	d.
3 ft. 6 in. diameter	per foot high	1	1	0
6 ft. "	"	2	0	0

Straight Iron Steps (including String and Rail on each side).

		£	s.	d.
3 ft. wide	per step	2	0	0
4 ft. „	„	2	4	0

Galvanized Iron Furnace Pans.

6 to 20 gallons	$6\frac{1}{2}d.$ per gallon.
60 to 100 „	$8d.$ „

Set of furnace ironwork for coppers, including door and frame hinges, latch, holdfasts, grate and bearing bars—$6\frac{1}{2} \times 5\frac{1}{4}$, 6s.; $8\frac{1}{2} \times 6\frac{1}{4}$, 12s.; 10×7, 16s. each.

Cast Iron Sashes.

		s.	d.
8 in. × 12 in.	each	4	10
12 in. × 18 in.	„	6	9
18 in. × 30 in.	„	9	6
33 in. × 48 in.	„	22	0

Stable and Harness-Room Fittings.

	From £	s.	d.		To £	s.	d.
Stall, manger, and hay rack, plain	2	7	6	..	4	10	0
Ditto, enamelled	3	5	0	..	5	10	0
Stall, manger, hay rack, and water trough, plain	2	12	6	..	4	12	6
Ditto, enamelled	3	15	0	..	5	15	0
Loose box, manger, and hay rack, plain	2	0	0	..	4	5	0
Ditto, enamelled	2	15	0	..	5	5	0
Loose box, manger, hay rack, and water trough, plain	2	15	0	..	4	12	6
Ditto, enamelled	3	15	0	..	5	15	0
Stall division, consisting of post, ramp, and cill	2	5	0	..	4	5	0
Ditto, all wrought iron	2	15	0	..	4	15	0
Stall division, consisting of post, ventilating ramp, and cill	3	15	0	..	8	10	0
Loose box posts, cast-iron	2	2	6	..	2	17	6
Ditto, wrought-iron	2	10	0	..	4	0	0
Inverted ventilating ramps for loose boxes	2	15	0	..	4	15	0
Ventilating grating for loose boxes per ft.	0	7	0	..	0	18	0
Iron framed loose box doors	6	0	0	..	8	0	0
Wrought-iron surface gutter, per ft.	0	2	6	..	—		

STABLE AND HARNESS-ROOM FITTINGS—*continued.*

	From £	s.	d.		To £	s.	d.
Trapped drain pots.. .. .. each	0	8	0	..	1	3	6
Patent brackets for driving harness:							
Single, japanned, 9*s.*; enamelled, 14*s.* 6*d.* per set.							
Double, japanned, 17*s.* 6*d.*; enamelled, 28*s.* per set.							
Patent brackets for riding harness:							
Japanned, 12*s.* 6*d.*; enamelled, 18*s.* 6*d.* per set.							
Japanned, 15*s.*; enamelled, 21*s.* 6*d.* per set.							
Coach-house door hinges, per pair	1	0	0	..	1	10	0
Patent stable paving bricks, 60 to the square yard:							
Welsh quality, 4*l.* 10*s.* per 1000.							
Staffordshire quality, 5*l.* 10*s.* per 1000.							
COW-HOUSE AND PIGGERY FITTINGS.							
Improved iron fittings for cow-stalls .. .. per cow	3	17	0	..	—		
Piggery fronts, consisting of trough, door, and standards	4	0	0	..	5	15	0
Sashes, cast-iron .. per ft. sup.	0	1	0	..	—		
Ditto, wrought-iron, with improved mitre joints .. .. per ft. sup.	0	1	6	..	—		
Casements from 6*s.* each extra.							
Wrought-iron doors and frames, panelled on one side, per ft. sup.	0	10	0	..	—		
Spiral or geometrical staircases, per foot high: 3 ft. 6 in. diam., 18*s.*, to 6 ft. diam., 34*s.*							

GAS FITTINGS.

	2 in.		1½ in.		1 in.		½ in.		¼ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Stout tin pipe.. per foot run	2	8	2	0	1	0	0	7	0	4½
Composition pipe per lb.	0	4	—		—		—		—	
Copper tube .. „	1	8	—		—		—		—	
Brass „ .. „	1	5	—		—		—		—	

ZINCWORKER.

MALLEABLE SHEET ZINC, LAID FLAT, WITH ROLLS COMPLETE.

	Price per Foot Super.					
Weight .. .. Zinc gauge.. ..	16 oz. 12	18 oz. 13	20 oz. 14	22 oz. 15	24 oz. 16	26 oz. 17
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In flats	0 6	0 6½	0 7½	0 8	0 9	0 9½
Gutters	0 6½	0 7	0 8	0 8½	0 9½	0 10
Verandahs ..	0 7½	0 8	0 9	0 9½	0 10	0 11

	Per Foot Run.				
	2 in.	2½ in.	3 in.	4 in.	5 in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Zinc pipes ..	0 5	0 6	0 7	0 10½	1 2
Eaves gutters ..	0 3½	0 4	0 4½	0 5½	0 7½

Zinc nails for slating, 5*d.* per lb.

	Per Foot Super.
	s. d.
Metal skylights	1 7
Perforated sheets for larders, &c.	5*d.* to 9*d.*
Zincworker .. .. per hour	0 10

COPPER.

	per cwt.
	£ s. d.
No. 20 W. G. 1 lb. 10 oz. per foot	5 10 0
22 " 1 4 "	5 10 0
24 " 1 0 "	5 10 0
26 " 0 12 "	5 10 0
28 " 0 8 "	6 0 0
30 " 0 6 "	7 10 0

Open washing coppers, up to 100 galls., per cwt. above price of strong copper, 30*s.*

	$\frac{3}{4}$ in.	1 in.	2 in.	
Wrought copper nails ..	1*s.* 9$\frac{1}{4}$*d.*	1*s.* 7*d.*	1*s.* 6*d.*	per lb.
	$\frac{3}{8}$ in.	$\frac{3}{4}$ in.		
" tacks	3*s.*	1*s.* 10*d.*		"

Copper, prime cost, sheet .. .. £86 to £87 per ton.

	Per Foot Run.	
	weight—lbs.	*s.* *d.*
Copper pipes, 2 inches diameter ..	$1\frac{1}{2}$	3 0
" $2\frac{1}{2}$ " ..	$1\frac{3}{4}$	4 0
" 3 " ..	$2\frac{1}{4}$	4 6
" 4 " ..	3	5 8
Joints	—	6*s.* to 7*s.*

	Per Foot Run.				
	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	$\frac{7}{8}$ in.	1 in.	2 in.
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Brass Tubing	0 2	0 4	0 6	0 9	1 6

BELLHANGER.

	s. *d.*
House bell, hung complete, with copper wire, each	11 6
" with concealed wires and tubes "	17 0
	per ft. run.
Copper tubing	0 8
Zinc "	0 4
	per lb.
" wire	1 6
Bellhanger .. .. per hour	0 $9\frac{1}{2}$
14 oz. bell, with steel spring and T plate back spring carriage .. .. each	6 0

PAINTER.

Common Colours.

	Per Yard Super.
	s. d.
Painting once in oil, including knotting and stopping	0 4½
Ditto twice ditto, ditto	0 7½
Ditto three times ditto, ditto	0 9½
Ditto four times ditto, ditto	1 0
Ditto each additional coat .. add	0 2
Flatting .. ,,	0 3
If sanded .. ,,	0 4
If in party colours .. ,,	0 2
Grounds for imitations .. ,,	0 0½
If grey, drab, or salmon colours .. ,,	0 1¼
,, Brunswick green .. ,,	0 1½
,, lilac, olive, or light green .. ,,	0 2
,, Indian red .. ,,	0 4
,, patent green, blue verditer, or yellow .. ,,	0 6
,, vermilion or lake .. ,,	1 9
,, imitation granite .. ,,	0 6

Ladder work about double the above prices.

Skirtings in Common Colours.

	Per Foot Run.	
	Plain not more than 8 in. wide.	Moulded not more than 12 in. wide.
	s. d.	s. d.
In oil, once	0 1	0 1¼
,, twice	0 1½	0 2
,, three times	0 2	0 2½
,, four ,,	0 2½	0 3
Flatted .. add	0 0½	0 0½

Reveals.

	Per Foot Run.	
	4½ in. wide.	9 in. wide.
	s. d.	s. d.
In oil, once	0 1	0 1½
„ twice	0 2	0 2¾
„ three times	0 2½	0 3½
„ four „	0 3	0 4

Common Colours.

	Per Foot Run.			
	1 coat.	2 coats.	3 coats.	4 coats.
	s. d.	s. d.	s. d.	s. d.
Rain-water pipes and gutters	0 2	0 3	0 3½	0 4
Plain cornices, not exceeding 10 in. girth	0 1½	0 2½	0 3	0 3½
Ditto flatted	0 2	0 3	0 3½	0 4
	per yard super.			
Enriched cornices, friezes, &c.	1 6	2 3	3 0	3 9
Ditto flatted .. .. add 9*d*.				
	per foot run.			
Mouldings and small articles	0 1	0 1½	0 2	0 2½
If varnished, for each coat, add 1*d*.				

Imitations.

	Per Yard Super.
	s. d.
Oak, combed and shadowed	1 6
Mahogany and maple	1 11
Satin wood	2 3
Rosewood	2 8
Yew, walnut, or amboyna wood	3 0

Imitation Marbles.

	Per Yard Super. s. d.
Veined marble, including white ground ..	2 3
Black and gold, dove, or Bardilla	4 0
Devonshire or Sienna	5 6
Oriental or verd antique	6 6

Sash squares per dozen .. .. = 1 yard of work.
„ frames .. .. = $\frac{2}{3}$ „

Varnishing.

	Per Yd. Sup. s. d.
Once, with best copal	0 7
Twice „	0 11
Three times „	1 3
If on the natural wood, add	0 4
Cleaning and sizing old work	0 8
Spirit varnish, each coat	0 5
	per ft. sup.
Hand polishing	0 6
„ to columns	1 0
„ to moulded work	1 6
French polishing	0 6
	per ft. run.
„ to handrails and small articles	0 4

Sash squares per dozen equal to one yard of work.
Sash frames equal to $\frac{2}{3}$rds of a yard.

Common Colours.

	Each. s. d.
Ordinary sash frames, once in oil	0 9
„ twice „	1 0
„ three times „	1 4
„ four times „	1 7

For Venetian or large frames add $\frac{1}{3}$rd.

	Per Dozen.
	s. d.
Sash squares, once in oil	0 10
„ twice „	1 1
„ three times „	1 5
„ four times „	1 9
Cleaning wainscot or mahogany square, and varnishing	2 8
Sash squares grained, wainscot or mahogany	1 4
Rosewood	1 9

WRITING.

	Per inch in Height.	
	Plain.	Egyptian.
	s. d.	s. d.
Plain letters	0 0½	0 0¾
Sunk „	0 0¾	0 1
Gold „	0 1½	0 2
„ large letters	0 2½	0 3

GILDING.

	Per ft. sup.
	s. d.
Gilding in oil, gold plain work	4 0
„ „ burnished „	5 0
	per ft. run.
„ „ ½-in. moulding	0 2½
„ „ ¾-in. „	0 3½
„ „ 1-in. „	0 4½
Bronze mouldings 2 in. girth	0 2

Manufacturers' Prices.

		s.	d.
Purple brown	per cwt.	14	0
Brown oxide of iron	„	14	0
Anti-corrosive crimson	„	14	0
Braganza green	„	24	0
Navy green	„	25	0
Victoria green	„	24	0
Bronze green	„	27	0
Celestial blue	„	24	0
Blue zinc	„	24	0
Italian yellow	„	33	0
Satin yellow..	„	22	0
Lemon chrome	„	30	0
Orange chrome	„	30	0
Stone colour..	„	24	0
New metallic chrome..	„	21	0
Flesh (or meat colour)	„	25	0
Orange lead	„	34	0
Ivory black	„	18	0
White lead—1st	„	30	0
„ 2nd..	„	27	0
„ 3rd	„	23	6
„ jointing	„	16	0
White zinc paint—1st	„	28	6
„ 2nd	„	25	0
Putty	„	7	6
Ozonized paint dryer	„	18	0
Macbean's Magnetic composition ..	„	24	0
Vulcan cement (for steam joints) ..	„	17	0
Soap powder..	„	18	0
Imperial black varnish	per gall.	1	5
French polish	„	9	0
Oak varnish	„	6	6
Copal	„	9	0
Gold size	„	6	6

Day Work.

		s.	d.
Painter	per hour	0	9½
Gilder	„	0	9½
Common colour	per lb.	0	6
Putty	„	0	3
Cement	„	0	6
Oil gold size	„	3	2
Gold leaf	per book	2	3

Paperhangers' Prices.

	Per Piece. s. d.
Pumicing, sizing, and preparing walls	0 6
Lining paper	1 0
Ditto, hanging	0 9
Canvas lining	3 0
Ditto, hanging complete	1 9
Hanging common papers	0 9 to 1 0
Ditto satin and embossed ditto	1 0 to 2 0
If in blocks, add	0 4
Sizing and varnishing, once	3 6
„ twice	6 6
Common papers in two colours	1 0 to 3 0

GLAZIER.

TARIFF PRICES.

The largest sizes which can be made in the various substances of sheet glass are as follows, but the extreme limits of length and width cannot be combined in the same sheet:—

	Extreme length.	Extreme width.	Extreme area.
15 ounces. ..	55 inches.	36 inches.	12½ feet.
21 „ ..	84 „	48 „	18 „
26 „ ..	84 „	48 „	17 „
32 „ ..	80 „	44 „	15 „
36 „ ..	70 „	42 „	13 „
42 „ ..	60 „	38 „	11 „

CROWN GLASS. (Usual thickness, exclusive of Glazing.)

	Per Foot Super.							
	Best.		2nds.		3rds.		4ths, or coarse.	
	s.	d.	s.	d.	s.	d.	s.	d.
Quarries	—		—		0	3	0	3
Square, 9 in. × 7 in.	0	6	0	5	0	3	0	2½
„ 9 in. × 7 in. to 12 in. × 9 in...	0	6½	0	5½	0	4	0	3
Square, 12 in. × 9 in. to 14 in. × 10 in.	0	7½	0	6½	0	4½	0	3½
Square, not above 18 in. ..	0	9	0	7¼	0	5½	0	4
„ 1½ ft. to 2 ft.	0	10	0	8½	0	6	0	4½
„ 2 „ „ 3 „	1	0	0	9½	0	6½	0	5
„ 3 „ „ 4 „	1	2	0	11½	0	7½	0	6
„ under 5 ft.	1	6	1	3	0	10	0	8
Extra thickness.								
Square, not exceeding 9 in. × 7 in...	0	8	0	6	0	3¾	0	2¾
Square, not exceeding 12 in. × 9 in...	0	9	0	7	0	5½	0	4
Square, not exceeding 14 in. × 10 in.	0	11	0	8½	0	6½	0	5
Square, not exceeding 2 ft. ..	1	4	1	2	0	8½	0	6¾
„ „ 3 „ ..	1	6	1	4	0	10	0	7½
„ „ 4 „ ..	1	9	1	6	0	11	0	9
„ „ 5 „ ..	2	3	1	10	1	3	1	0

Flatting, 2*d.*; polishing, 3*d.*; obscuring, 3*d.*; glazing, 4*d.* per foot extra.

SHEET GLASS. (Exclusive of Glazing.)

In squares, cut to order, not exceeding,			Per Foot Super.				
			Picture Qualities.		Glazing Qualities.		
In area.	In length.	In width.	A.	B.	Best.	2nds.	3rds.
15 oz.			s. d.	s. d.	s. d.	s. d.	s. d.
Under 9 by 7	..	..	0 7	0 6	0 5	0 3½	0 2¾
,, 12 ,, 9 & Quarries	..	..	0 8	0 7	0 6	0 4½	0 3¼
,, 14 by 10	..	..	0 9	0 8	0 7	0 5½	0 4½
Not above 1½ ft.	..	..	0 10	0 9	0 8	0 6	0 4½
,, 2 ft.	50 in.	36 in.	1 0	0 10½	0 9	0 6½	0 4¾
,, 3 ,,	..	..	1 1	1 0	0 9½	0 7	0 5
,, 4 ,,	..	..	1 2	1 1	0 10½	0 7½	0 5½
,, 6 ,,	..	..	1 3	1 2	0 11	0 8	0 6
,, 8 ,,	..	..	1 5	1 3	1 0	0 9	0 6½
,, 11 ,,	..	..	1 7	1 5	1 2	0 10	0 7
,, 13 ,,	55 ,,	38 ,,	1 10	1 7	1 3	0 11	0 8
,, 15 ,,	60 ,,	40 ,,	Not	made	Not	Not	made
,, 17 ,,	65 ,,	42 ,,	..	..	made	..	..
,, 19 ,,	70 ,,	44 ,,	..	..	..	..	..
,, 20 ,,	75 ,,	46 ,,	..	..	..	..	..
,, 21 ,,	80 ,,	48 ,,	..	..	..	..	..
,, 22 ,,	85 ,,	49 ,,	..	..	..	..	..
21 oz.							
Under 9 by 7	..	..	0 8	0 7	0 6	0 5	0 3½
,, 12 ,, 9 & Quarries	..	..	0 9	0 8	0 7	0 6	0 4½
,, 14 by 10	..	..	0 10	0 9	0 8	0 7	0 6
Not above 1½ ft.	..	..	0 11½	0 10	0 9	0 8	0 6½
,, 2 ft.	50 ,,	36 ,,	1 1	0 11	0 10	0 9	0 7
,, 3 ,,	..	..	1 2	1 0	0 10½	0 9½	0 7½
,, 4 ,,	..	..	1 3	1 1	1 0	0 10	0 8
,, 6 ,,	..	..	1 4	1 2	1 0	0 10½	0 8½
,, 8 ,,	..	..	1 5	1 3	1 1	0 11	0 9
,, 11 ,,	..	..	1 7	1 5	1 3	1 0	0 9½
,, 13 ,,	55 ,,	38 ,,	1 9	1 6	1 4	1 1	0 10½
,, 15 ,,	60 ,,	40 ,,	2 3	2 0	1 6	1 2	1 0
,, 17 ,,	65 ,,	42 ,,	Not	made	1 9	1 4	1 2
,, 19 ,,	70 ,,	44 ,,	..	..	2 2	1 8	1 4
,, 20 ,,	75 ,,	46 ,,	..	..	2 8	2 0	1 7
,, 21 ,,	80 ,,	48 ,,	..	..	..	2 6	2 0
,, 22 ,,	85 ,,	49 ,,	..	..	..	3 0	2 6

SHEET GLASS. (Exclusive of Glazing.)—*continued.*

In squares, cut to order, not exceeding,			Per Foot Super.			
			B.	Glazing Qualities.		
In area.	In length.	In width.		Best.	2nds.	3rds.
			s. d.	s. d.	s. d.	s. d.
26 oz.						
Under 9 by 7	..	..	0 9	0 8	0 7	0 5
„ 12 „ 9 & Quarries	..	..	0 10	0 9	0 8	0 5½
„ 14 by 10	..	..	0 11	0 10	0 9	0 6½
Not above 1½ ft.	..	..	1 1	0 11½	0 10	0 8
„ 2 ft.	50 in.	36 in.	1 2	1 1	0 10½	0 8½
„ 3 „	..	..	1 3	1 1	0 11	0 9
„ 4 „	..	..	1 4	1 2	0 11½	0 9½
„ 6 „	..	..	1 5	1 3	1 0	0 10
„ 8 „	..	..	1 7	1 4	1 1	0 11
„ 11 „	..	..	1 8	1 5	1 2	1 0
„ 13 „	55 „	38 „	1 10	1 6	1 3	1 1
„ 15 „	60 „	40 „	2 3	1 9	1 4	1 2
„ 17 „	65 „	42 „	Not	2 3	1 6	1 3
„ 19 „	70 „	44 „	made	2 9	1 10	1 5
„ 20 „	75 „	46 „	Not	made	2 3	1 9
„ 21 „	80 „	48 „	..	..	2 9	2 3
„ 22 „	85 „	49 „	..	..	3 3	2 9
32 oz.						
Under 9 by 7	..	..	1 1	0 11	0 9	0 7
„ 12 „ 9 & Quarries	..	..	1 2	1 0	0 10	0 8
„ 14 by 10	..	..	1 3	1 1	0 11	0 9
Not above 1½ ft.	45 in.	34 in.	1 5	1 3	1 0	0 10
„ 2 ft.			1 7	1 4	1 2	0 10½
„ 3 „	..	..	1 9	1 6	1 3	0 11
„ 4 „	..	..	1 10	1 7	1 4	1 0
„ 6 „	..	..	1 11	1 8	1 5	1 1
„ 8 „	..	..	2 1	1 10	1 7	1 2
„ 11 „	50 „	36 „	2 4	2 0	1 9	1 3
„ 13 „	55 „	38 „	2 8	2 3	2 0	1 5
„ 15 „	60 „	40 „	3 1	2 9	2 3	1 8
„ 17 „	65 „	42 „	3 6	3 1	2 8	2 0
„ 19 „	70 „	44 „	Not	3 6	3 0	2 4
„ 20 „	75 „	46 „	made	Not	3 6	2 9
„ 21 „	80 „	48 „	..	made	Not	3 3
„ 22 „	85 „	49 „	..	..	made	3 6

SHEET GLASS. (Exclusive of Glazing.)—*continued.*

In squares, cut to order, not exceeding,			Per Foot Super. Glazing Qualities.		
In area.	In length.	In width.	Best.	2nds.	3rds.
36 oz.			s. d.	s. d.	s. d.
Under 9 by 7	..	..	1 2	0 11	0 9
„ 12 „ 9 & Quarries	..	..	1 4	1 1	0 11
„ 14 by 10	..	..	1 6	1 3	1 1
Not above 1½ ft.	45 in.	34 in.	1 8	1 6	1 3
„ 2 ft.			1 10	1 7	1 4
„ 3 „	..	..	2 0	1 8	1 5
„ 4 „	..	..	2 1	1 9	1 6
„ 6 „	..	..	2 3	1 10	1 7
„ 8 „	..	..	2 6	2 0	1 8
„ 11 „	50 „	36 „	2 9	2 1	1 9
„ 13 „	55 „	38 „	3 0	2 6	2 0
„ 15 „	60 „	40 „	3 6	3 0	2 6
„ 17 „	65 „	42 „	4 3	3 6	3 0
„ 19 „	70 „	44 „	Not	made	3 6
„ 20 „	75 „	46 „	..	..	Not
„ 21 „	80 „	48 „	..	..	made.
„ 22 „	85 „	49 „	..	..	..
42 oz.					
Under 9 by 7	..	..	1 6	1 3	1 0
„ 12 „ 9 & Quarries	..	..	1 8	1 5	1 2
„ 14 by 10	..	..	1 10	1 8	1 4
Not above 1½ ft.	45 „	34 „	2 0	1 10	1 6
„ 2 ft.			2 1	1 11	1 7
„ 3 „	..	..	2 4	2 0	1 8
„ 4 „	..	..	2 6	2 1	1 9
„ 6 „	..	..	2 9	2 4	1 11
„ 8 „	..	..	3 0	2 6	2 0
„ 11 „	50 „	36 „	3 3	2 9	2 2
„ 13 „	55 „	38 „	3 9	3 0	2 6
„ 15 „	60 „	40 „	4 6	3 8	3 0
„ 17 „	65 „	42 „	Not	4 6	3 6
„ 19 „	70 „	44 „	made	Not	4 3
„ 20 „	75 „	46 „	..	made	Not
„ 21 „	80 „	48 „	..	..	made
„ 22 „	85 „	49 „	..	..	..

SHEET GLASS—*continued.*

Fluted Sheet—15 oz. and 21 oz., not above 43 in. long, in crates, 2*d.* per ft., and in squares, not above 2 ft. sup., 3*d.* per ft., above 2 ft., 4*d.* per ft.; 15 oz. and 21 oz., 44 to 50 in. long, in crates, 3½*d.* per ft., and in squares, not above 2 ft. sup., 4½*d.* per ft., above 2 ft., 5½*d.* per ft.—more than the prices of 3rds sheet; 26 oz. and 32 oz., in crates and in squares, double the prices of Fluted 15 oz. and 21 oz. respectively. Of each size and substance.

Obscured Sheet, of all substances, in crates, 1*d.*, in squares, 1½*d.*, and in quarries, 1¾*d.* per ft., more than the prices of 3rds sheet. Of each size and substance.

Polishing, 4½*d.* per ft. extra gross.

Grinding edges, 5*d.* per lineal ft. gross.

Bending—at special prices, according to quantity, &c.

Embossed glass, 1*s.* 8*d.* to 5*s.* per superficial foot.

PATENT PLATE GLASS.

This glass is supplied of two colours—THE USUAL (i. e. crystal), and the EXTRA-WHITE, which is almost colourless. For glazing purposes, the usual is preferable, as being harder, more lustrous, and less liable to be scratched in cleaning. In these respects, patent plate, of this kind, is as superior to thick polished plate, as it is to that of the extra white colour; but for engravings, water-colour drawings, miniatures, &c., extra white patent plate is, so far at least as colour is concerned, unrivalled. It is only manufactured of Nos. 1 and 2 thicknesses.

PATENT PLATE GLASS. (Exclusive of Glazing.)—*continued.*

Explanation of thicknesses, Nos. 1, 2, 3, and 4.

Average thickness.	Average weight.
No. 1, $\frac{1}{16}$ in.	13 oz. per ft.
No. 2, $\frac{1}{12}$,, ...	17 ,,
No. 3, $\frac{1}{10}$,, ...	21 ,,
No. 4, $\frac{1}{9}$,, to $\frac{1}{8}$ in.	24 ,,

USUAL COLOUR—at per Foot Superficial.

Squares.		Best Quality. B.				Second Quality. C.				Third Quality. CO.			
		No.1.	No.2.	No 3.	No.4.	No.1.	No.2.	No.3.	No.4.	No.1.	No.2.	No.3.	No.4.
Above	Not exceeding in area (and not exceeding in length 50 in., or in width 36 in.)	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
10 × 8 in.	.. 12 × 9 in.	2 9	2 9	2 9	2 9	2 5	2 5	2 5	2 5	2 2	2 2	2 2	2 2
12 × 9 ,,	.. 1 ft.	3 0	3 0	3 0	3 1	2 9	2 9	2 9	2 9	2 3	2 3	2 3	2 4
1 ft.	.. 2 ,,	3 6	3 6	3 6	3 8	2 11	3 0	3 0	3 1	2 6	2 7	2 7	2 8
3 ,,	.. 4 ,,	3 10	3 11	4 1	4 3	3 5	3 6	3 7	3 9	3 1	3 2	3 3	3 5
5 ,,	.. 6 ,,	4 3	4 5	4 6	4 8	3 10	3 11	4 0	4 2	3 5	3 7	3 8	3 10
10 ,,	.. 12 ,,	5 0	5 1	5 2	5 4	4 8	4 8	4 8	4 10	4 3	4 3	4 3	4 4
12 ,,	.. 13 ,,	5 3	5 3	5 4	5 6	4 9	4 9	4 10	5 0	4 3	4 3	4 4	4 6

Extra-white Patent Plate—at per Foot Superficial.

The Thicknesses are the same as those of Patent Plate of the "Usual Colour."

Squares.

Best Quality. B.				No. 1.	No. 2.
Above		Not exceeding in area		s. d.	s. d.
1 ft.	..	2 ft.	and not exceeding in length 50 in., or in width 36 in.	4 1	4 4
5 „	..	6 „		4 11	5 3
10 „	..	12 „		5 9	6 3

Second Quality. C.				No. 1.	No. 2.
Above		Not exceeding in area		s. d.	s. d.
1 ft.	..	2 ft.	and not exceeding in length 50 in., or in width 36 in.	3 7	3 11
5 „	..	6 „		4 5	4 9
10 „	..	12 „		5 3	5 9

Third Quality. CC.				No. 1.	No. 2.
Above		Not exceeding in area		s. d.	s. d.
1 ft.	..	2 ft.	and not exceeding in length 50 in., or in width 36 in.	2 7	2 8
5 „	..	6 „		3 4	3 6
10 „	..	12 „		4 2	4 3

British Polished Plate Glass. (Exclusive of Glazing.)

	Per super. foot.			
	Ordinary Glazing.		Best Glazing	
	s.	d.	s.	d.
In plates containing not above 1 ft. super.	1	3	1	6
,, ,, 2 ,,	1	8	1	11
,, ,, 3 ,,	2	0	2	3
,, ,, 4 ,,	2	2	2	5
,, ,, 6 ,,	2	6	2	9
,, ,, 10 ,,	2	10	3	2
,, ,, 16 ,,	3	0	3	4
,, ,, 20 ,,	3	1	3	5
,, ,, 30 ,,	3	2	3	7
,, ,, 50 ,,	3	4	3	9
,, ,, 70 ,,	3	6	3	11
,, ,, 80 ,,	3	7	4	3
,, ,, 90 ,,	3	8	4	6
,, ,, 100 ,,	4	0	5	0

Larger plates, or plates exceeding 160 inches long or 96 inches wide, at higher prices.

The usual thickness of polished glass is about $\frac{1}{4}$ inch, but if required to be selected of special thicknesses, the following prices will be charged:—

Exact $\frac{1}{4}$ in. or $\frac{1}{4}$ in. bare, 3*d*. per foot additional.
$\frac{3}{16}$ths .. .. .. — ,, ,,
$\frac{5}{16}$ths .. .. .. 2*d*. ,, ,,
$\frac{3}{8}$ths .. .. .. 4*d*. ,, ,,

Grinding edges of glass not above $\frac{3}{8}$ths thick, one farthing per lineal inch, net; above $\frac{3}{8}$ths thick, at special prices.

Polishing edges not above $\frac{3}{8}$ths inch thick, three half-pence per lineal inch, net; above $\frac{3}{8}$ths thick, at special prices.

The charge for re-polishing glass is 1*s*. 2*d*. per foot net, for each side polished; and all glass sent to be re-polished or re-silvered, will be at the owner's risk and expense.

Extra Thick Polished Plate Glass.
(Exclusive of Glazing.)

	Per Foot Super.											
	$\frac{3}{16}$ in.		$\frac{1}{2}$ in.		$\frac{5}{8}$ in.		$\frac{3}{4}$ in.		$\frac{7}{8}$ in.		1 in.	
In plates not above	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
2 ft. super.	2	10	6	0	7	3	8	5	9	9	11	1
4 ,, ...	3	2	6	2	7	5	8	7	9	11	11	4
6 ,, ...	3	6	6	4	7	7	8	9	10	1	11	7
9 ,, ...	3	9	6	6	7	10	9	0	10	4	11	10
12 ,, ...	4	0	6	8	8	1	9	3	10	7	12	1
15 ,, ...	4	2	6	9	8	3	9	5	10	9	12	7
20 ,, ...	4	4	6	10	8	5	9	7	10	11	13	1
25 ,, ...	4	6	6	11	8	6	9	8	—		—	
30 ,, ...	—		7	1	8	6	9	8	—		—	
35 ,, ...	—		7	3	8	7	9	10	—		—	
40 ,, ...	—		7	9	9	4	10	1	—		—	
45 ,, ...	—		8	3	10	1	—		—		—	
50 ,, ...	—		8	9	10	4	—		—		—	

Larger plates at special prices.

Rough Cast Plate Glass,
in Thicknesses as under.

	Per Foot Super.									
	$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{1}{2}$ in.		$\frac{3}{4}$ in.		1 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
In plates not above 1 ft. super.	0	8	0	9	0	9½	4	0	5	0
,, ,, 3 ,,	0	9	0	9½	0	10	4	4	5	4
,, ,, 5 ,,	0	9½	0	10	0	10½	4	6	5	6
,, ,, 8 ,,	0	10	0	10½	0	11	4	7	5	7
,, ,, 10 ,,	0	10½	0	11	0	11½	4	8	5	8
,, ,, 20 ,,	0	11	0	11½	1	0	4	9	5	9
,, ,, 40 ,,	0	11½	1	0	1	0½	4	10	6	0
,, ,, 60 ,,	1	0	1	0½	1	1	5	0	—	

Grinding one side, 1s. per ft. } for all sizes and
,, both sides, 2s. per ft. } thicknesses.

BENDING POLISHED AND ROUGH PLATE GLASS, not over $\frac{1}{2}$ in. thick, to ordinary Curves.

Polished.	Per Foot. s. d.
In plates under 6 ft. super. .. .. .. net	2 3
,, ,, 12 ft. ,, ... ,,	2 9
,, ,, 20 ft. ,, ... ,,	3 3
,, ,, 40 ft. ,, ... ,,	3 9
,, ,, 60 ft. ,, ... ,,	4 0

Rough Glass 3*d.* per foot less than the above.

HARTLEY'S PATENT ROUGH PLATE GLASS. (Per Foot Super.)

	Thickness.							
	$\frac{1}{8}$ in.		$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{1}{2}$ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Plain glass, in squares, under 10 in. × 8 in.	0	5	0	7	0	9	1	0
Plain glass, in squares, under 3 ft. sup.	0	7	0	10	0	11	1	3
Plain glass, in squares, under 10 ft. sup.	0	9	1	0	1	1	1	5
Fluted glass, in squares, under 10 in. × 8 in.	0	6	0	8	0	10	1	0
Fluted glass, in squares, under 3 ft. sup.	0	9	1	0	1	2	1	6
Fluted glass, in squares, under 10 ft. sup.	0	11	1	2	1	4	1	8

Patent Glass Revolving and Sliding Ventilators.

	26 oz.			Plate.		
	£	s.	d.	£	s.	d.
1 ft. super. .. .. each	0	14	0	0	17	0
2 ft. „ .. .. „	1	3	0	1	8	0
4 ft. „ .. .. „	1	18	0	2	7	0
5 ft. „ .. .. „	2	4	0	2	15	0
6 ft. „ .. .. „	2	9	0	3	2	0

	£	s.	d.
Moor's Louvre Ventilators, 12 in. × 12 in. each	1	5	0
„ „ 12 „ × 24 „ „	1	18	0
„ „ 20 „ × 24 „ „	2	8	9
„ „ 24 „ × 30 „ „	3	0	6

Lead Lights Glazed with Crown Glass.

	Per Foot Super.	
	s.	d.
Square, 6 in. × 4 in.	1	2
„ 4 „ × 4 „	1	4

Glass Tiles.

Rolled Rough Plate. Sheet.

Thickness.		Plain.		Fluted. Small Pattern.		Fluted. Large Pattern.		Substance.			
		s.	d.	s.	d.	s.	d.			s.	d.
⅛ in.	each	0	10	0	10½	0	11	16 oz.	each	0	6
$\frac{3}{16}$ „	„	0	11	0	11½	1	0	21 „	„	0	8
¼ „	„	1	0	1	0½	1	1	26 „	„	0	10
⅜ „	„	1	6	1	8	1	10	32 „	„	1	0
½ „	„	2	0	2	2	2	4				

Corrugated Tiles—double price.

Glass Slates.

Rough Plate.

			Thickness.									
			$\frac{1}{8}$		$\frac{3}{16}$		$\frac{1}{4}$		$\frac{3}{8}$		$\frac{1}{2}$	
			s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Duchess ..	24×12	each	1	3	1	6	1	9	2	1	2	8
Small Imperials	20×14	„	1	2	1	5	1	8	2	0	2	7
Small Duchess	22×12	„	1	2	1	5	1	8	2	0	2	7
Countess ..	20×10	„	0	11	1	1	1	3	1	6	1	10
Viscountess..	18×10	„	0	10	1	0	1	1	1	4	1	8
Large Ladies	16×10	„	0	9	0	11	1	0	1	3	1	6
Ladies	16× 8	„	0	8	0	9	0	10	1	0	1	2
Doubles ..	13× 7	„	0	6	0	7	0	8	0	10	1	0

Sheet.

			16 oz.		21 oz.		26 oz.		32 oz.	
			s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Duchess ..	24×12	each	0	9	1	1	1	4	1	8
Small Imperials	20×12	„	0	8	1	0	1	3	1	7
Small Duchess	22×12	„	0	8	1	0	1	3	1	6
Countess ..	20×10	„	0	7	0	10	1	0	1	3
Viscountess..	18×10	„	0	6	0	9	0	11	1	1
Large Ladies	16×10	„	0	6	0	8	0	10	1	0
Ladies	16× 8	„	0	5½	0	7	0	8	0	10
Doubles ..	13× 7	„	0	5	0	6	0	7	0	8

Patent Plain Rolled Rough Plate.—Per Superficial Foot.

The principal uses of this Glass are for railway sheds, public buildings, factories, workshops, skylights, offices, and other purposes where the object is to intercept the vision but not the light.

—	Plain, i. e. with fine lines on the surface.					
	1/8	3/16	1/4		3/8	
	d.	d.	s.	d.	s.	d.
	6	7½	0	9	0	11
	6½	8	0	9½	1	0
Squares, cut to the sizes, not exceeding, in area—						
9 × 7	5	6	0	7	0	8
2 feet	6½	8	0	9½	0	11½
4 „ 100 in. long, 32 in. wide ..	7	8½	0	10	1	0
10 „ „ „	8	9½	0	11	1	1
20 „ 110 in. long, 34 in. wide ..	9	10½	1	0	1	3
30 „ above 120 in. long, or 36 in. wide	—	11½	1	1	1	4
Quarries	6	7½	—		—	

Rough cast plate is supplied in ¼ and ⅜ thicknesses, at the same price as plain rolled.

Grinding Edges, 4*d.* per lineal foot gross.

Obscuring on the Rough Side, 6*d.* per foot gross, for sizes not exceeding 90 inches long.

Bending.—At special prices, according to thickness, kind, quantity, and curve.

PATENT FLUTED ROLLED ROUGH PLATE—Per Superficial Foot.

	Fluted (exclusive of Glazing). No. 2, Small Pattern. About 11 flutes to the in. $\frac{1}{8}$	No. 2 $\frac{3}{16}$	No. 2 $\frac{1}{4}$	No. 2 $\frac{3}{8}$	No. 1, Large Pattern. About 4 flutes to the in. $\frac{1}{8}$	No. 1 $\frac{3}{16}$	No. 1 $\frac{1}{4}$	No. 1 $\frac{3}{8}$
	d.	d.	s. d.	s. d.	d.	s. d.	s. d.	s. d.
—	6½	8	0 9½	0 11½	7	0 8½	0 10	1 1
	7	8½	0 10	1 1	8	3 9½	0 11	1 3
Squares cut to the sizes, not exceeding, in area—								
9 × 7	5½	6½	0 7½	0 8½	6	0 7	0 8	0 9
2 feet	7	8½	0 10	1 0	7½	0 9	0 10½	1 1
4 „ 100 in. long, 32 in. wide	7½	9	0 10½	1 1	8	0 9½	0 11	1 2
10 „ „ „	8½	10	0 11½	1 2	9	0 10½	1 0	1 3
20 „ 110 in. long, 34 in. wide	9½	11	1 1	1 4	10	1 0	1 2	1 6
30 „ above 120 in. long, or 36 in. wide	—	—	—	—	—	—	—	—
Quarries	6½	8	—	—	—	—	—	—

PATENT DIAMOND AND QUARRY ROLLED ROUGH PLATE.—Per Superficial Foot.

The principal uses of these kinds of Rolled Plate are for lecture rooms, government offices, banks, asylums, churches, chapels, schoolrooms, &c.	Diamond.			Quarry. Small Pattern.			Quarry. Large Pattern.		
	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Squares, cut to sizes under— 8 × 6..	0 8	0 9	0 10	0 9	0 11	1 1	0 9	1 0	1 3
14 × 10 and under $1\frac{1}{2}$ ft. super., if the length does not exceed 20 inches	0 $9\frac{1}{2}$	0 $11\frac{1}{2}$	1 3	1 0	1 3	1 6	1 2	1 5	1 8
$1\frac{1}{2}$ ft. sup., and under 3 ft. sup., or if above 20, and not above 30 inches long	0 10	1 0	1 4	1 1	1 4	1 7	1 3	1 6	1 9
6 ft. sup., and under 8 ft. sup., or if above 40, and not above 45 inches long	1 0	1 3	1 7	1 5	1 8	1 11	1 7	1 10	2 1
12 ft. sup., and under 13 ft. sup., or if above 65, and not above 70 inches long	1 2	1 5	1 9	1 8	1 10	2 2	1 10	2 0	2 3
14 ft. sup., and under 15 ft. sup., or if above 75, and not above 85 inches long	1 4	1 7	2 0	1 10	2 0	2 4	2 0	2 2	2 5

PATENT DIAMOND PLATE—*continued.*

Diamond Rough Plate has a bright and brilliant appearance. The pattern is of a lozenge shape, and in relief upon the body of the glass.

Patent Quarry Rolled Plate is used as a substitute for leaded quarries. For buildings of an ecclesiastical character, the Large Pattern, which is of the size of the ordinary Quarry Ten, is preferable; but for other purposes, and windows of small dimensions, the Small Pattern, which is about one-fourth only of the size of the other, is recommended. Iron Saddle Bars, for forming the joints—3*d.* per running foot net.

SUNDRIES.

SPEAKING TUBES.

	⅜ in.	½ in.	1 in.	1½ in.
Zinc	5*d.*	5½*d.*	6*d.*	6½*d.*
Copper	8*d.*	8½*d.*	9*d.*	10*d.*

Mouthpiece, with whistle, ivory, each, 7*s.* 6*d.*

ELSLEY'S PATENT SASH LEVER.

	Iron.	Part Gun-metal.
To open 1 sash	18*s.* 6*d.*	30*s*
,, 2 ,, ...	23*s.* 6*d.*	36*s.*
,, 4 ,, ...	38*s.* 6*d.*	48*s.*

BLINDS.

	Per foot.
Outside blinds, striped linen tick, including cases ..	2*s.* 6*d.*
Inside blinds, white linen, including roller, &c. ..	6½*d*
Ditto, including roller and spring	9*d.*
Venetian, painted	10*d.*

FIRE HOSE.

	1 in.	1½ in.	2 in.	3 in.
Leather, copper rivetted ..	1*s.* 9*d.*	2*s.* 1*d.*	2*s.* 7*d.*	3*s.* 6*d.*
Canvas	9*d.*	1*s.*	1*s.* 2*d.*	1*s.* 7*d.*

TYE & ANDREWS' PATENT SINK TRAP.

	3 in.	4 in.	6 in.
Each ..	7*s.* to 10*s.*	8*s.* 3*d.* to 13*s.* 9*d.*	37*s.* 6*d,* to 43*s.* 9*d.*

Patent Articles.

Miscellaneous. Prices at Warehouse.

Bavin's stoneware dip-traps, each, 10*s*.
Stiff's interceptor sewer air-trap, 6 in., each, 15*s*.
,, ,, ,, ,, 9 in. ,, 25*s*.

Ventilators.

Comyn, Ching, & Co.'s,	10 in. × 4 in.	.. .. each	5*s*. 6*d*.
,, ,,	11 in. × 7 in.	.. .. ,,	6*s*. 6*d*.
,, ,,	10 in. × 9 in.	.. .. ,,	9*s*. 6*d*.
Ditto, with brass plate	11 in. × 7 in.	.. .. ,,	12*s*. 6*d*.
,, ,,	16 in. × 11 in.	.. .. ,,	25*s*.

	Galvanized Iron.	Zinc.
Boyle's turret ventilators, for 4 in. pipes,	1*l*. 11*s*.	1*l*. 13*s*. 6*d*.
,, ,, 9 ,,	3*l*. 2*s*.	3*l*. 7*s*.
,, ,, 18 ,,	8*l*. 16*s*.	9*l*. 12*s*.

Sherringham's ventilators:

Box.	Front.	Plain Iron.	Japanned.	Brass.
9 in. × 3 in.	11½ in. × 5½ in.	4*s*.	5*s*.	18*s*. 6*d*.
9 in. × 6 in.	11 in. × 8¼ in.	5*s*. 6*d*.	6*s*. 6*d*.	30*s*.
13½ in. × 6 in.	16 in. × 8½ in.	7*s*.	8*s*.	50*s*.
Arnott's	11 in. × 8 in.	5*s*. 6*d*.	7*s*.	17*s*. 6*d*.
,, ...	16 in. × 9 in.	8*s*. 9*d*.	10*s*. 6*d*.	30*s*.

Approximate Price List of Lifts.

Width of Cage.	Depth of Cage.	Height of Cage.	Weight will Carry.	Height to Travel.	Size of Runners.	Size of Well Hole.	Price
ft. in.	ft. in.	ft. in.		ft.	in. in.	ft. in. ft. in.	£
2 2	1 6	2 9	56 lbs.	14	2½×2½	1 9×2 7¼	18
2 9	2 0	3 6	2 cwt.	30	3 ×3	2 3×3 3½	29
3 6	3 0	6 6	4 ,,	30	3 ×3	3 3×4 0½	75*

* Including safety apparatus to suspend cage, should rope break.

Prices include the runners in well hole, cross timbers for carrying gearing, the cage, ropes, gearing, spring catch, counterbalance, weight, &c., packed and in London.

Single iron doors per foot super., 10*s*. 6*d*. to 12*s*. 6*d*., not fixed.
Strong room doors ,, 24*s*. 3*d*. to 60*s* ,,
Ditto, complete from £16 10*s*. each ,,

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